Strategic Analysis and Plan for Implementing Telemedicine at Fort Greely

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By

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To improve access to care the Alaska Federal Healthcare Partnership established a telemedicine program. Medical Department Activity (MEDDAC) Alaska is considering extending their portion of the telemedicine program to cover Fort Greely and the surrounding area. To best accomplish this, a strategic analysis and business case analysis was conducted. Introspective strategic analysis tools revealed an organization that is capable of supporting a telemedicine program at Fort Greely. Prospective strategic analysis tools lead to an aggressive stance for implementing telemedicine. An analysis of three deployment courses of action suggests that either an AFHCAN and Commercial Off the Shelf (COTS) hybrid, or a pure COTS system would best serve the organization. A simple business case analysis resulted in a break-even point using the NPV method at five years for 473 beneficiaries served; for the expected population of 300 the project loses $117,505.48 over the same period. Recommendations for implementation include fixing MEDDACs existing telemedicine program, establishing measures for success, and deploying an AFHCAN and Commercial Off the Shelf (COTS) hybrid system.

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Abstract

To improve access to care the Alaska Federal Healthcare Partnership established a telemedicine program. Medical Department Activity (MEDDAC) Alaska is considering extending their portion of the telemedicine program to cover Fort Greely and the surrounding area. To best accomplish this, a strategic analysis and business case analysis was conducted. Introspective strategic analysis tools revealed an organization that is capable of supporting a telemedicine program at Fort Greely. Prospective strategic analysis tools lead to an aggressive stance for implementing telemedicine. An analysis of three deployment courses of action suggests that either an AFHCAN and Commercial Off the Shelf (COTS) hybrid, or a pure COTS system would best serve the organization. A simple business case analysis resulted in a break-even point using the NPV method at five years for 473 beneficiaries served; for the expected population of 300 the project loses $117,505.48 over the same period. Recommendations for implementation include fixing MEDDAC's existing telemedicine program, establishing measures for success, and deploying an AFHCAN and Commercial Off the Shelf (COTS) hybrid system.

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Introduction

Overview of Bassett Army Community Hospital

Bassett Army Community Hospital (BACH) is a medium-sized Medical Department Activity (MEDDAC) located at Fort Wainwright, adjacent to Fairbanks, Alaska. BACH serves as the primary military medical treatment facility (MTF) north of the Alaska Range providing primary and specialty care services to approximately 72,000 beneficiaries both north and south of the Alaska Range (U.S. Army Medical Command, 2002). BACH has a total of 43 operating beds, an average daily bed census of 10.96, and an average daily admission of 5.27 patients which are predominantly new born infants and their mothers; BACH has 1.75 births per day on average (U.S. Army Medical Command). BACH additionally has established a satellite clinic at Fort Richardson located approximately 8 miles from downtown Anchorage, Alaska.

Staffing levels in many specialty areas are below authorizations, making each specialty provider a critical asset to the organization. Assignment to a military billet in Alaska constitutes an overseas placement with tours of duty set at 36 months.

Conditions Which Prompted the Study

<u>Alaska: Geographical Challenges</u>

With a landmass of 590,000 square miles, Alaska ranks as the largest state and least densely populated with roughly 635,000 people. Alaska is one fifth the total size of the remaining 49 states combined, and cut in half each portion would still rank

#1 and #2 in total land mass with Texas placing third (Rogers, 1990).

Nearly half of the state's population resides in Anchorage, a city located south of the Alaska Range on the southern coastline where temperatures are milder than much of the rest of the state. Alaska contains 17 of the 20 tallest mountains in the United States, with more than 3000 rivers, 3 million lakes over 20 acres in size, yet only has 3 major highways linking the state (Rogers, 1990). Many of the villages and outlying areas are without connection to the rest of the world: travel to these areas is usually by plane or boat and oftentimes these villages lack phone connectivity to the outside world. Even more provincial locales lack normal means of accessibility: the capital of Alaska, Juneau, is the only U.S. state capital that is unreachable by road.

<u>Providing Health Care in Alaska</u>

Access to health care is an ongoing challenge, with much of the state classified as medically underserved with primary care physician per 100,000 population in non-metropolitan areas well below the national average; Alaska ranks 46th (Health Resources and Services Administration, 2002). Not captured in the data is the fact that much of the physician population is clustered around "metropolitan" areas of the state. Figure 1 depicts the dispersion of providers per 100,000 population for the state. A cursory analysis of the diffusion of providers may suggest that northern portions of the state have adequate coverage but in reality what is demonstrated is a lack of population. One

provider within a 100-mile radius will skew the results and does not factor the ruggedness of the terrain and weather conditions that separate the patient from that single provider.

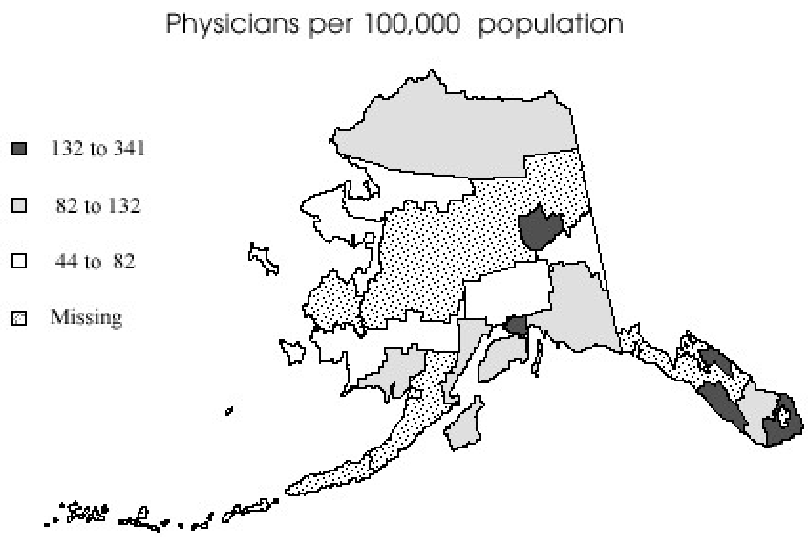


Figure 1. Physicians per 100,000 population (Health Resources and Services Administration)

To mitigate the effects of geographic isolation Alaska developed the Community Health Aide Program (CHAP) to improve access to at least a basic level of health care for constituents (Community Health Aide Program (CHAP) Director's Association, 2001). Community Health Aides (CHAs) or credentialed Community Health Aide Practitioners (CHA/Ps) provide health services to many of the geographically isolated Alaskans. Additionally, Alaska has aggressively recruited physician extenders and is ranked 1st of all states for Physician Assistants and Nurse Practitioners per capita (Health Resources and Services Administration).

Alaska Federal Health Care Partnership (AFHCP)

Federal and state health care agencies have long sought ways to improve economies of scale and resource sharing, with the roots of an informal alliance started in the 1980s between the Air Force and Veteran's Affairs (VA). This initial pairing of the Air Force and VA eventually led to the decision to not build a VA hospital in Anchorage but rather enter into a DoD/VA Joint Venture in which the VA would occupy part of the new 3rd MDG/Elmendorf AFB hospital completed in 1998 (Alaska Federal Health Care Partnership, 1997).

The alliance expanded to include several other agencies over the ensuing years. In January 1995, leaders from the USCG, DoD, VA, and IHS met to determine the best structure for further addressing Tri-Agency initiatives. After much discussion, in August 1995, they formalized a statewide, inter-agency organization calling it the *Alaska Federal Health Care Partnership* (Alaska Federal Health Care Partnership, 1997). In January 1999, the Partnership expanded and admitted another member, Alaska Native Tribal Health Consortium. The formal members of the Partnership are the Army, Air Force, Coast Guard, Veterans Affairs, Indian Health Service and the Alaska Native Tribal Health Consortium.

Alaskan Federal Health Care Access Network (AFHCAN)

The partnership from its earliest beginnings sought ways to leverage resources. Recent advances in telemedicine technologies and in-state support for advanced telehealth network systems opened the door for a dramatic improvement in

the delivery of health care and health education to remote and rural environments. The AFHCP saw these technological advances as a unique opportunity to reduce certain costs and greatly improve health services to all Federal health care beneficiaries in Alaska (Alaska Federal Health Care Partnership, 1998). This venture would become AFHCP's most visible demonstration of interoperability of partner members.

The Alaskan Federal Health Care Access Network (AFHCAN) was an ambitious undertaking, seeking to design and build telemedicine equipment using off-the-shelf technologies, use existing or create where none exists communication pipelines, and deploy a software package to make the equipment functional. The AFHCAN Project Office (APO) under the direction of AFHCP established a four-year deployment plan using a budget of $30 million. The scope of deployment included over 250 telemedicine carts at 235 separate sites (Alaska Federal Health Care Partnership, 1998). The fact that APO eventually had to write the software due to the lack of viable preexisting software platforms only accentuates the scale of this endeavor.

As of the 1st of October, 2002 AFHCAN has transitioned from deploying the telemedicine network to seeking ways to leverage the existing infrastructure. The APO also began exploring avenues to bring in revenue to sustain operations and testing other telemedicine product lines (Alaska Federal Health Care Partnership, 2002).

As a member of the partnership, BACH received six telemedicine carts: two were deployed to the Primary Care clinic

(Kamish Clinic), one to the ENT clinic, one to the Internal Medicine clinic, one to the Pediatrics clinic, and one to the satellite clinic at Fort Richardson (AFHCAN Project Office, 2002). The fielding to BACH and Fort Richardson Clinic was recently completed.

Fort Greely

Fort Greely is located on the convergence of the Richardson and Alaska Highways about 100 miles southeast of Fairbanks. The nearest city, Delta Junction, has a total population of 890. Fort Greely has a storied history, dating back to 1942 when it was established as a staging area for aircraft to lease to the Russians in the World War II effort (Delta Junction Chamber of Commerce, 2003).

Fort Greely's prominence as a military installation peaked in the 1950s, but has served as a cold weather testing station for equipment and personnel into the 1990s. A Base Realignment and Closure (BRAC) finding in 1995 selected Fort Greely as a target for absorption by the local community. By July of 2001 only a small group of personnel remained on the installation to keep core facilities from deterioration. MEDDAC-Alaska had closed down its clinic and signed over its building by June of 2001. All care for DoD beneficiaries was contracted to Dr. Ray Andreassen in Delta Junction using Tricare Prime Remote policies; there are currently eight Tricare Prime Remote enrolled beneficiaries in the Delta Junction/Fort Greely area.

President Bush formally announced the establishment of the Base Missile Defense Office (BMDO) as a part of the National

Defense Missile System in December of 2002 (Department of Defense, 2002). Fort Greely was chosen as a primary test site for BMDO because of its proximity to the Pacific Rim.

With the reopening of Fort Greely to conduct missile testing an influx of approximately 300 service members and retirees are expected (City of Delta Junction, 2003). Future plans for MEDDAC-Alaska medical coverage include an expansion of the contract with Dr. Andreassen, deployment of telemedicine to Fort Greely, and potential construction of a new medical clinic (K. Hardcastle, personal communication March 3, 2003).

Statement of the Problem

If MEDDAC-Alaska is to improve quality care to TRICARE Prime Remote patients located at Fort Greely using telemedicine, a strategic analysis and implementation plan is needed. This plan must address the current capabilities of the telemedicine carts, software, and communications pipeline deployed by AFHCAN. It should incorporate those areas that match MEDDAC's mission and vision and identify potential cost savings or losses if deployed.

Inherent in the charter that initiated the AFHCAN effort, members of the partnership control the direction of their telemedicine programs (Alaska Federal Health Care Partnership, 1997). An implementation and utilization plan for Fort Greely telemedicine capabilities does not exist. This lack of a plan can be best described with the following problem statement: How should MEDDAC-Alaska deploy telemedicine to Fort Greely?

Literature Review

Telemedicine: An Overview

Telemedicine has been defined as the use of telecommunications to provide medical information and services (Brown, 2002). When dealing with any technology, it is key to understand not only the associated hardware and the software that runs it, but one must grasp the technology conceptually. Technologies that depend on the computer as their main enabler essentially fall into two paradigms: store and forward (S&F) technologies (aka, asynchronous), and real-time technologies (aka, synchronous). Email is an example of an asynchronous technology; instant messaging chat or telephonic communications are examples of synchronous. Telemedicine systems follow this conceptual model, falling into the store and forward camp, real-time interaction, or a hybrid of the two. AFHCAN is predominantly a store-and-forward technology, with plans to incorporate real-time capabilities on a wider basis as the network matures (L. Lekness, personal communication September 6, 2002).

Telemedicine: Beginnings

Telemedicine technologies date back to the pretelevision era with, possibly, the first documented use occurring in the early 1900s when radio communications were used for providing medical services to Antarctica (Maheu, Whitten, & Allen, 2001). Other notable early uses of telemedicine technologies include the National Aeronautics and Space Administration's (NASA) monitoring of astronauts via remote telemetry in the 1960s, a

comprehensive telemedicine system in Norway in the early 1980s (Kayser, Szymas, & Weinstein, 1999), and clinical trials using image transmission between Logan International Airport and Massachusetts General Hospital in 1985 (Slack, 2001).

However, by 1985 only one of the early North American telemedicine programs remained active and the future of this use of technology in healthcare was in doubt. It was not until the beginning of the 1990s that telemedicine was reassessed as a way to improve access to care for those in rural areas (Maheu, Whitten, & Allen, 2001). Telemedicine spurred on this new era through advances in image digitization and data compression technology, which helped enable synchronous videoconferencing over low-bandwidth lines (Maheu et al., 2001).

The Office for the Advancement of Telehealth (OAT), formed in 1998, served as a coordination hub for many of the fledgling telemedicine initiatives that sprouted up during the mid-1990s. While not a regulatory body, OAT provides guidance to telehealth initiatives as well as apportions federal grants to telehealth programs. OAT helped sustain many programs that would not have survived after their initial grant funding through direct assistance and remains a major player in the telemedicine community today (Maheu et al.). With the emergence of the Internet as a common data flow medium, telemedicine has again moved to the forefront of medical futurist thinking.

Telemedicine: Examples of Current Use

Telemedicine has become a factor for several aspects of the health care system: clinical, educational, and remote medical

instrument applications have all been irrevocably changed with the new acceptance of telemedicine technologies (Guler & Ubeyli, 2002).

Clinical applications of telemedicine run virtually the whole gamut of treatment intervention including: pathology (Kayser et al. 1999), rehabilitation (Ricker, Rosenthal, Garay, DeLuca, Germain, Abraham-Fuchs, & Schmidt, 2002), surgery (Ruurda, van Vroonhoven, & Broeders, 2002), cardiology (Drozdov, Obukhova, Orlov, Levanov, & Nenast'eva, 2002), nursing (Dinsdale, 2002), otolaryngology (Ullah, Gilliland, & Adams, 2002), psychiatry (Hilty, Luo, Morache, Marcelo, & Nesbitt, 2002), and dermatology (Lim, Egerton, See, & Schumack, 2001).

Educational uses of telemedicine are not limited to email newsletters, continuing medical education (CME) via the Internet, or video-teleconference seminars, but also include using telemedicine equipment and technologies themselves to teach inexperienced clinicians with real examples (Aas, 2002; Maheu et al. 2001).

Remote medical instrument applications of telemedicine include advanced surgical techniques with robotics (Pott & Schwarz, 2002), remote ECGs (Drozdov et al. 2002), and remote microscopy (Strauss, Felten, Okada, & Marchevsky, 1999).

Studying several of the applications of telemedicine provides insight what may prove beneficial to MEDDAC-AK and Fort Greely. A few potential areas have been excluded because MEDDAC-AK and Fort Greely. This is because they either do not have a program implemented currently, thus requiring creation of

the program before telemedicine can be incorporated with it, or because the program is not within their core missions.

Telemedicine Use Examples: Dermatology

In a study by Duker and Elsner (2002), dermatology was examined for its appropriateness for incorporating telemedicine technologies. Because dermatology is a visually-based specialty it was viewed as well suited to capitalize on telemedicine initiatives. Arguably, AFHCAN’s most referred consultation type is dermatology, where CHA/Ps send images to consulting practitioners using a digital camera.

Teledermatology is seen as a method to optimize dermatological care. Chen, Lim, and Shumack (2002) studied the impact of telemedicine on rural healthcare by analyzing teledermatology consults post hoc for errors. Their findings suggest that education on proper image taking techniques greatly improves the accuracy of diagnoses; consulting clinicians tend to orient exclusively on the image sets sent. However, image quality and size referencing is important. Therefore consulting dermatologists should ask more leading questions as well as ensure that pictures taken include some indication of size of the area. AFHCAN telemedicine carts are fielded to organizations with measurement stickers for placement next to patient focal areas (Figure 2).

Figure 2. Image taken from AFHCAN cart camera of skin anomaly.

Accuracy of teledermatology diagnoses has been researched and found promising. According to Lim, Egerton, See, and Schumack (2001) teledermatology diagnoses were 86% consistent amongst multiple dermatologists that studied the images of 49 patients compared to a 49% consistency rating of general practitioners who saw the same patients. The results suggest that consulting with a dermatologist, regardless of whether it is an in-person visit vice a teleconsult, is more accurate than a general practitioner attempting to handle the case on their own.

In a study at the University of Arizona, Krupinski, Barker, Rodriguez, Engstrom, Levine, Lopez, and Weinstein (2002) found no significant difference between in-person consults and teledermatology referrals when case complexity was controlled for. The study compared diagnostic codes of the referrals to find differences, as well as time lapse between the referral and actual encounter; time period between referral and actual

patient encounter by the consulting provider was significantly less for teledermatolgical cases than for in-person encounters.

As with all medical technology interventions, patient and provider satisfaction with the procedure is important. In a qualitative study of teledermatology by Weinstock, Nguyen, and Risica (2002), both patients and providers felt teledermatology was beneficial and would recommend it based on their responses to a post-teledermatology intervention. However, patients were split in overall satisfaction with the technology citing concerns over lack of provider contact, wait-time, and uncertainty of the quality of follow-up. Providers expressed greater overall satisfaction, but were concerned about handling the increased demand the program might generate.

Telemedicine Use Examples: Surgery

Advances in technology and the increasing use of telemedicine have begun the transformation of surgery (Makin, Breen, & Monson, 2001). In a study by Doarn, Fitzgerald, Rodas, Harnett, Prabe-Egge, and Merrill (2002) the economic feasibility and accuracy of diagnosis of presurgical and postsurgical telemedicine consults was assessed. They found that pre- and postoperative telemedicine consultations had a high measure of clinical accuracy, and demonstrated some economic value to the patient in reduced travel costs.

Use of telesurgery methods is seen as beneficial for many types of surgical interventions. Ruurda, van Vroonhoven, and Broeders (2002) suggest that laparoscopic telesurgery offers advantages to patients in terms of improved outcomes (less

rehabilitation needed) but presents a need for surgeons to learn new operating techniques via telemanipulation of robotics. Vascular telesurgery, using store and forward technologies can be used to adequately assess and provide treatment protocols for vascular patients according to Minion, Sprang, and Endean (2002). In their study diagnoses and treatment recommendations by the remote physician were found to be comparable to the conventional on-site examinations. Additionally, patient satisfaction, in terms of access and perceived quality of care, was noted to be extremely high (Minion et al., 2002). Pap, Lach, and Upton (2002) explored plastic surgery and telemedicine implementation. Using a store and forward solution, plastic surgery residents responded to consult request transmitted digital photographs by means of the Internet to the attending physician on call. The usual phone call between resident and attending physician benefited from the additional photographic data, and patient management often resulted in less-ambiguous treatment plans. The use of digital images was especially helpful for the evaluation of radiographs and complex wounds of the hand and face (Pap et al., 2002).

Telemedicine Use Examples: Ear, Nose and Throat (ENT)

Ear, nose, and throat specialty care (aka otolaryngology) implementation of telemedicine is closer to reality according to Goldenberg and Wenig (2002). The potential opportunity for use in otolaryngology is tempered with technological, legal, and financial barriers that exist in implementing any technology. Goldenberg and Wenig suggest that as telecommunication and

audio-visual technologies advance telemedicine in otolaryngology will become cost effective and patient outcomes efficacious.

Research exists to at least partially support Goldberg and Wenig's belief that telemedicine in otolaryngology is closer to a reality. In a study that assessed the value of real-time telemedicine using low-cost videoconferencing equipment for otorhinolaryngology consultations Ullah, Gilliland, and Adams (2002) found that diagnoses and management plans using telemedicine technologies were correct in 34 of 42 patients. They propose that low bandwidth real-time medicine is a useful technique, and should be considered in general practice settings when referring otorhinolaryngology consultations, but issues of provider inexperience in using the equipment would need addressing.

Telemedicine Use Examples: Diabetes Management

Management of diabetic patients requires an ongoing commitment from both the patients and their providers. Telemedicine enabled management of diabetic patients appears valuable to both the patients and the organizations that medically manage their disease.

Gomez, Hernando, Garcia, Del Pozo, Carmeno, Corcoy, Brugues, and De Leiva (2002) studied the feasibility of using telemedicine tools to collect, manage, view and interpret data, and to exchange data and messages as a part of the ongoing diabetic management process. The results of their research indicate that telemedicine is a viable method to help manage a diabetic patient's disease: communication between patient and

provider increased over the life of the study, beneficial therapeutic modifications by physicians increased, and HbA1c ("blood sugar" test) results showed a trend of improvement.

In a similar study Bellazzi, Larizza, Montani, Riva, Stefanelli, d'Annunzio, Lorini, Gomez, Hernando, Brugues, Cermeno, Corcoy, De Leiva, Cobelli, Nucci, Del Prato, Maran, Kilkki, and Tuominen (2002) implemented a telemedicine pilot program consisting of two modules; a Patient Unit (PU) and a Medical Unit (MU) were connected via the Internet. Patients, using the PU, could automatically send their monitoring data from the blood glucose device to an MU at the hospital. The MU allowed physicians the ability to visualize the data, analyze that data with decision support tools, and then send corresponding therapeutic advice to the patient. The program enjoyed improved communications and clinical outcomes over non-telemedicine methods.

Telemedicine in diabetes management has shown promise, not only in terms of patient outcomes, but also in reduced costs to the managing organization, and improvement in other administrative considerations. Biermann, Dietrich, Rihl, and Standl (2002) studied telemanagement of patients on intensified insulin therapy, focusing on the fiscal and administrative aspects. A randomized experimental design was established where patients were broken down into either a telemedicine group or a conventional care control group. Biermann et al. (2002) found that patient time expenditure per month decreased significantly, and cost savings to the managing medical center annually per

patient was several hundred dollars. However, physician time expenditure was moderately higher per month per patient, and there was no significant difference in decrease of HbA1c results between the two groups. These results suggest that there are timesavings to diabetic patients, reduced costs to the managing organization, and no significant difference in quality of outcomes as measured by metabolic control tests, when using telemedicine-enabled management over conventional means.

Telemedicine Use Examples: Pediatrics

Pediatric consults are a common referral on the AFHCAN network (A. Galway, personal communication October 7, 2002). The body of evidence supports this use. Teleconsultation has been submitted as a way telemedicine can improve practice techniques and keep pediatricians informed of the latest medical information available on advancements in information technology (Panigrahi & Pradhan, 2002).

Other instances of telepediatric use have been shown. According to Sable (2002), pediatric cardiologists have used real-time neonatal telecardiology to improve accuracy of diagnoses and reduce costs, with no noticeable increase in utilization when used in lieu of a face-to-face consult. AFHCAN enabled consults for pediatrics are mostly ear related problems. The referring provider can also use the video otoscope to show the child and their guardian how the child's ear looks (i.e., patient education) via the telemedicine cart monitor (A. Galway, personal communication October 7, 2002).

Patients and families seem to find the use of telemedicine

in pediatrics beneficial. In a study of telemedicine use for pediatric surgical care, Miller and Levesque (2002) found that patient and family satisfaction with telepediatric surgical consultation and follow-up appointments was very high. Nearly 100% of those parents returning survey indicated they would recommend telemedicine again.

Telemedicine Use Examples: Psychiatry

As noted in most of the examples above, telemedicine provides a useful alternative to both the initial consult and follow-up patient encounter compared to conventional in-person methods. In a comprehensive review of the literature related to telepsychiatry Hilty, Luo, Morache, Marcelo, and Nesbitt (2002) found that patient and provider satisfaction is generally high, is economically feasible, offers several models of care and consultation to the provider, and can have positive effects on patient behavior. Particularly effective use of telepsychiatry is in the domain of patient education where providers felt they could guide their patients to a better understanding of their affliction through telemedicine techniques versus conventional means (Hilty et al., 2002).

Perhaps the most valid reason for implementing a telepsychiatry program is to offer this service to those in underserved areas: Sumner (2001), and Miller, Kraus, Kaak, Sprang, and Burton (2002) believe that telepsychiatry has potential to greatly improve access to mental services for those in rural areas, while providing these services at a comparable price and quality.

Telemedicine Use Examples: Radiology

Teleradiology seems tailor-made for telemedicine, and many health organizations have deployed a Picture Archiving Communications System (PACS) in their radiology departments. A filmless paradigm such as a PACS represents a shift in provider and organizational thinking. Instead of lighted shadow boxes to read film taken by an X-Ray machine, computers are now at the center of the diagnosis process. Note: MEDDAC-AK has a PACS system in place, but it is not directly linked to the AFHCAN network.

The shift in thinking is supported by research. Wadley, Hayward, Trambert, Kywi, and Hartzman (2002) conducted a retrospective study of enterprise and community-wide deployed PACS comparing its implementation with conventional film-based methods. The filmless (PACS) methodology was not only highly regarded by physicians but usage levels corroborated this belief. Wadley et al. (2002) also found that productivity levels increased, patient quality of care improved due to more efficient communication means, and patient satisfaction was comparable to film-based methods.

Implementation of a teleradiology program incurs additional requirements to the deploying organization. Radiologists will need additional training in digital image acquisition techniques, PACS technology and its administration (i.e., how the system works and is put into operation), compression of images, and quality control; Bartholmai, Erickson, Hartman, King, Meredith-James, Hangiandreou, and Williamson (2002)

suggest the development of a structured Electronic Imaging and Technology fellowship program for radiologists. Salvador, Gonzalez, Munoz, and Pascual's (2002) research also supports the need for additional training. In a study that compared two teleradiology programs where general practitioners referred cases to radiologists, the program that employed radiologists with advanced training in PACS produced greater numbers of repeat-image requests. This suggests that the quality of images and accuracy of diagnoses is an improvement in programs where radiologists are fully trained in the capabilities of PACS.

However, teleradiology is not a panacea. Jacobs, Edmondson, and Lowry (2002) compared the diagnostic results of teleradiology and plain radiography for maxillofacial fractures. In cases where minute fractures were present, teleradiology was seen as less reliable and had poorer image quality than plain radiography. These findings suggest that teleradiology is less effective when complex images are viewed. Teleradiology may never completely replace normal radiographic techniques.

Telemedicine Use Examples: Pathology

One of the earliest uses of telemedicine in its current form is telepathology (Kayser et al., 1999). As an early import to telemedicine there is a large body of research on telepathology, where mixed messages of its viability are portrayed. Telepathologic research focuses on both static and real-time image transmission, virtual microscopy, cost effectiveness, and extended uses (teleeducation, and telebiopsy assistance).

In an early study regarding the use of static images and

email transmission of those images Della-Mea, Forti, Puglisi, Belluta, Finato, Dalla Palma, Mauri, and Beltrami (1996) found that static image-based diagnoses produced encouraging results despite an occasional misdiagnosis. Other subsequent research supports this view: in a study of the Armed Forces Institute of Pathology’s (AFIP) use of diagnostic pathology, Williams, Mullick, Butler, Herring, and O'leary (2001) found a significant concordance rate between telepathologic static image consults and final diagnoses made with the actual sample. However, issues over image quality and quantity reduced the author’s recommendation for wholesale adoption of telepathology industry-wide. Weinberg, Allaert, Dusserre, Drouot, Retaillau, Welch, Longtine, Brodsky, Folkerth, and Doolittle (1996) found similar issues with lack of sufficient images, which was frequently cited as a reason for diagnostic uncertainty. However, additional findings of their research suggest a high correlation between glass slides and digital images of the sample. Weinberg et al. (1996) conclude that with sufficient clinical information about the patient from which the sample was taken, as well as additional images, a digital image in lieu of glass slide samples telepathology has a place alongside normal pathological practices. Other research on the use of static imagery indicates similar results; Allaert, Weinberg, Dusserre, Yvon, Dusserre, Retaillau, and Cotran (1996), Strauss, Felten, Okada, and Marchevsky (1999), and Zhou, Hogarth, Walters, Green, and Nesbitt (2000) all found the use of static images in telepathology to be a practical diagnostic tool.

When compared to static image telepathologic programs, less is known about real-time systems perhaps because recent technological advances have made real-time transmission a fact instead of fiction. In Zhou et al. (2000) static image use compared to real-time video images of glass slides revealed that real-time video resulted in higher diagnostic accuracy. Virtual microscopy is synchronous, and its use shows promise, especially where Internet connection speeds allow and a telemicroscope is deployed; BACH implemented this program but it has fallen into disuse. Key to deploying a remote system is the ease of use by the consulting provider (Petersen, Wolf, Roth, & Schluns, 2000), acceptance by users, cost and affordability of equipment, and adequate communication structure (Schwarzmann, Binder, & Klose, 2000). Outcomes appear to be improved when using virtual microscopy over glass slides sent to the consulting provider, or static images, perhaps because the provider has an opportunity to manipulate the portion of the sample seen and do so with quicker diagnostic turn-around time (Strauss, Felten, Okada, & Marchevsky, 1999).

Telepathology uses extend beyond pure diagnostic services and include teleeducation, and teleconsults. In a study by Onguru and Celasun (2000) implementation of telepathology within a hospital was not only a method to improve the speed of diagnoses back to the referring physician, but was a way to teach providers about variant pathological diagnoses. This educational benefit is not unnoticed by medical vendors: a sperm quality analyzer machine was ‘loaned’ to BACH’s pathology

department recently by a vendor, with one of the machine’s most touted features being the ability to make CD-ROM disks that contained movies of the sperm motility and count.

Telepathology, like most telemedicine areas, has been promoted as a way to reduce costs. According to Jukic and Bifulco (1999) telepathology represents the future of healthcare because it can lower the cost of expensive diagnostic workups sent outside an organization. This cost savings is not fully realized if the healthcare organization has a resident pathologist on staff (Jukic & Bifulco). In a study that compared telepathologic methods to provide a frozen-section service to a remote hospital Della-Mea, Cortolezzis, and Beltrami (2000) found at higher case loads telepathology was cheaper when not factoring in a low-cost ambulance service in the area. Since medical evacuation of patients, blood, providers, etc., in Alaska is an expensive venture, this research may support implementing telepathology in the state for the reduced evacuation cost of specimens alone.

As mentioned previously, pundits view telepathology with mixed emotions. According to Strauss, Felten, Okada, and Marchevsky (1999) telepathology is best suited for the diagnosis of small biopsy specimens rather than the inclusion of large amounts of data: both complexity of images and quantity were correlated to lower diagnostic accuracy. Della-Mea and Beltrami (2000) suggest that the true usefulness of telepathology will not be felt until technology advances, in particular bandwidth, are realized. Mairinger (2000) states that telepathology may be

a route to reducing costs. However, telepathology still incurs increased training demands as it is not as simple to use than conventional methods, and may cause competitive rivalries among pathology service providers since geographic constraints are largely removed. Gombas, Skepper, and Hegyi (2002) suggest that telepathology is limited to static image transmission techniques, and that issues of bias with regards to image selection remain even when using static imagery. Finally, according to Wells and Sowter (2000) the future of telepathology is clouded because of the wide-spread use of proprietary systems, and the high costs associated with these systems. Until a standard set of telepathology systems is adopted industry-wide, telepathology may not reach maturity.

Complexity of Implementing Advanced Technologies

Introduction and implementation of any new technology is a difficult process, and incorporating telemedicine practices at BACH is no exception. Issues surrounding the technology complexity, provider acceptance, politicization of new initiatives, incorporating the new hospital building into the program designs, credentialing of providers, reimbursement of teleconsults, legal and ethical issues, and patient acceptance of the telemedicine program must be considered.

The complexity of the AFHCAN telemedicine technology is a large obstacle to overcome. The AFHCAN telemedicine system consists of three major pillars: the telemedicine cart with equipment, the communications network infrastructure, and the telemedicine software (Alaska Federal Health Care Partnership,

1998). If one of these three aspects of the program is not functioning properly the whole system could cease to provide any value to the organization, causing providers and patients to lose interest in the program.

The telemedicine cart and equipment is a hybrid system of off-the-shelf computing peripherals, with plug-ins for a video otoscope, a digital still camera, and an electrocardiograph (AFHCAN Project Office, 2002). While the computer that all the equipment plugs into is not proprietary, nor is the touch screen monitor, memory card reader or any other piece of the setup, the cart's physical structure is unique and all of the components combined form a one-of-a-kind system. This unique setup was not unnoticed by MEDDAC-Alaska's Chief of Logistics and Chief of the Information Management Division (IMD): a special Memorandum of Agreement (MOA) was drafted to address the method by which the carts and equipment would be serviced (Hoyt and Shankle, 2002). The communications infrastructure by AFHCAN is a closed system whereby connectivity of each cart was to a special server maintained by IMD, requiring a unique Internet Protocol (IP) address for each cart, and the lines to external portions of the AFHCAN network were kept isolated from normal data traffic lines. MEDDAC-Alaska's portion of the AFHCAN network is not connected to the Internet. Finally, the software that runs the telemedicine program, although browser based, is proprietary and will require either direct technical support from the AFHCAN Project Office or the hiring of an in-house programmer to maintain perpetually. None of the issues above attempt to

address the problems that would arise if MEDDAC-Alaska leadership decided to open up its portion of AFHCAN to Internet connectivity.

Provider acceptance of telemedicine is a concern in most telemedicine programs, and Fort Greely would be no exception. Based on acceptance levels in MEDDAC-Alaska, convincing providers at the Delta Junction Family Medical Clinic may be an uphill battle. Informal comments made by providers at BACH include, “I never asked for this system, don’t know how to use it but I will if I am told to,” “It’s a 200 pound dust collector in my opinion,” and “Until I can refer cases to the consulting physician I normally send patients to [to Madigan Army Medical Center at Fort Lewis, Washington] I see no value in it.” When asked by the providers who work in areas of the hospital where the carts have been deployed, only one had received training on the system prior to its placement in their work area. Physician extenders and enlisted auxiliary staff were less involved: they were told that only providers could touch the carts. Research supports that when there is a lack of provider and staff buy-in that telemedicine initiatives often fail (Linderoth, 2002).

Because of the perceived success of the AFHCAN project, as well as the usual processes that occur with new programs initiated in an organization, politicization of implementing telemedicine at Fort Greely is likely inevitable. Telemedicine will cross several organizational boundaries including the already mentioned Logistics – Information Management Divisional servicing responsibility “gray” area. It is predicted that

Clinical Services, Managed Care, Department of Nursing will weigh in on the best uses of the project.

Completion of construction and occupation of the new hospital will pose organizational challenges on nearly every level of MEDDAC-Alaska. Maintaining a seamless telemedicine capability, and dedicating physical space to the carts are concerns. As are ensuring the sufficient quality and quantity of communication lines to the AFHCAN network. Inclusion of Fort Greely adds to this complexity.

A classic problem with telemedicine programs is one of credentialing and licensure of providers, especially across state lines. While this may be mitigated if consults are mainly within military channels for TRICARE Prime and Prime Remote patients, credentialing will be an issue if the MEDDAC-Alaska telemedicine program extends its reach to non-beneficiaries. Problems of credentialing have been discussed in much of the research on telemedicine: Harrington (1999), Lane (2002), Yadav and Lin (2001), Guler and Ubeyli (2002), and Simpson (2002) place credentialing and licensure issues at or near the top of problems associated with implementing telemedicine.

Legal and ethical issues complicate the use of implementing telemedicine. Lane (2002) states that both patients and providers open themselves up to potentially litigious situations whenever patient advice is given without an in-person visit. Harrington (1999) spells out a large list of legal and ethical 'land mines' that providers should avoid when practicing via telemedicine. McCarty and Clancy (2002) agree: the practice of

social work across state-lines or intra-state without seeing the patient in person is rife with problems. However, Lane's article in support of abolishing telemedicine was unique; other articles discussed issues and presented ways to mitigate legal and ethical risks associated with telemedicine.

The last and major hurdle that MEDDAC-Alaska would have to overcome to have an effective and vibrant telemedicine program is patient acceptance. It has been said that patient satisfaction is more closely related to a physician's bedside manner than anything else. As noted previously, patient satisfaction appears to be generally high with telemedicine, especially in terms of improved access and reduced turn-around time for results. This remains to be seen for Fort Greely patients. Access to care that can be given by Dr. Andreassen has lacked close scrutiny for one primary reason: his services are the only option for hundreds of miles. It is expected that if telemedicine capabilities can reduce the need for visits to Fairbanks or other areas for patients, then their buy-in is more likely.

Purpose

Effective utilization of assets in the dynamic environment of healthcare delivery requires a systematic assessment of the organization, external factors, and future indicators (Ginter, Swayne, & Duncan, 1998). For this reason, many organizations conduct analyses before implementing any new program. A comprehensive use of the results of the tools below will allow for a greater understanding of the relevant factors involved in

deploying telemedicine to Fort Greely.

The purpose of this study is to conduct a feasibility analysis of deploying telemedicine to Fort Greely, and develop a strategic plan for implementation. Necessarily included in this analysis and plan are assessments of MEDDAC-Alaska and AFHCAN's capabilities.

In order to accomplish these goals, introspective and prospective analysis tools will be utilized, as well as a business case analysis of deploying telemedicine to Fort Greely. Additional products resulting from the analysis are: key and essential personnel involvement by position, suggested training and orientation education, and a draft phased-deployment timeline for implementation. Other tools are needed to help sustain a telemedicine deployment: a proposed Balanced Score Card to align activities with desired outcomes, some suggested future initiatives, and a reference list for AFHCAN technical assistance. These tools will be developed as a part of the actual Fort Greely telemedicine project.

Methods and Procedures

The first step is conducting a baseline analysis of current practices using strategic analysis tools, and interviews of key personnel both in the telemedicine industry as well as at MEDDAC-Alaska. A review of each tool, how they will be used and their limitations are below. Results of each strategic analysis tool are included as appendices. The second step of the strategic analysis, using data gained from the baseline examination, employs prospective analysis tools that will

suggest future strategies for implementation of telemedicine.

Introspective Analysis Tools: Strengths, Weaknesses, Opportunities, and Threats (SWOT)

Perhaps most widely known of the included analyses for this project, a SWOT attempts to address the internal strengths and weaknesses, and the external opportunities and threats an organization faces (Ginter et al., 1998). A SWOT Analysis serves as a foundation for where the organization stands presently and ties into several of the other tools that will be used. Misuse of the SWOT tool usually lies within how the analyst operationally defines each of the categories: one person's threat is another person's opportunity.

Appendix A shows the SWOT for deploying telemedicine to support Fort Greely beneficiaries. No specific order of interpreting the results is necessary, but searching for major themes in each of the areas is a useful technique.

Introspective Analysis Tools: Situational Analysis

A Situational Analysis seeks to further quantify and qualify both internal and external factors impacting an organization (Ginter et al.). Used in conjunction with the SWOT Analysis, the strategic analyst delves deeper into an organization's makeup to establish the current posture of that organization. Analysts can misuse the Situational Analysis by not including sufficient depth in their factor identification, or because they have 'gotten into the weeds' on what is included.

Appendix B is the Situational Analysis for Fort Greely telemedicine deployment. The analyst moves from the general to

specific, and external to internal when conducting a Situational Analysis. As with the SWOT, it is useful to search for major themes.

Introspective Analysis Tools: Stakeholder Analysis

A Stakeholder Analysis determines those entities and agencies that may be impacted by the organization or initiative (Ginter et al.). The analysis aspect comes to bear in determining how much impact would be felt by the stakeholder in terms of the project or organization. Analysts tend to oversimplify the stakeholder map including more stakeholders than is necessary for a complete analysis.

Appendix C depicts the Stakeholder's Analysis of a Fort Greely telemedicine deployment. Those stakeholders inside the blue ring are considered to have greater impact on the organization analyzed than those on the periphery.

Introspective Analysis Tools: Value Chain Analysis

The Value Chain Analysis attempts to assess the organization's product or service lines before, during, and after deploying them to a customer with the underlying organizational culture, resources and structure as underlying support activities. It is a useful 'snapshot' tool but analysts can overstate this use, especially if the assessment is viewed as a stand-alone document.

Appendix D displays a Value Chain Analysis for deploying telemedicine to Fort Greely beneficiaries. Value Chain Analyses are useful to see the products/services offered within the context of culture, resources, and structure of the

organization.

Introspective Analysis Tools: Porter's Analysis

A Porter's Analysis attempts to incorporate environmental influences that would hinder or facilitate an organization (Ginter et al.). It considers market pressures brought to bear on an organization in terms of buyers, suppliers, rivalry amongst competitors, potential entrants, and substitutes for the product or service offered by an organization. A tendency for analysts to stretch the applicability of this tool makes it less potent; its use as a part of the strategic analysis for Fort Greely telemedicine implementation will be judicious.

Appendix E shows the Porter's Analysis for telemedicine deployment to Fort Greely beneficiaries. The 'hub and spoke' layout of the results serves as a graphic representation of how external forces can bear in on an organization. The analyst lists key factors influencing the product or service offered by an organization under each main concept (Buyers, Suppliers, etc.).

Prospective Analysis Tools: Threats, Opportunities, Weaknesses, Strengths (TOWS) Matrix

A TOWS Matrix is seemingly a SWOT applied to quadrants but is more useful than a rearrangement of strengths, weaknesses, opportunities and threats. A TOWS Matrix is the first tool of those included that helps the analyst visualize a directional strategy for the organization (Ginter et al.). TOWS matrices are best employed in conjunction with other directional strategy forming tools such as the Strategic Position and Action

Evaluation (SPACE) Analysis because where TOWS and SPACE Analysis results overlap they can validate each other. Misuse of the TOWS Matrix predominantly comes from an analyst having a preconceived notion of which directional strategy an organization should take.

Appendix F depicts the TOWS Matrix for a Fort Greely telemedicine deployment. The analyst aligns strengths, weaknesses, opportunities and threats into their respective quadrants (Ginter et al.). An assessment of the most relevant area along the Y Axis of the tool (Opportunities, Threats; External to the organization) is combined with one along the X Axis (Strengths, Weaknesses; Internal to the organization). The strategies in the intersecting quadrant are recommended.

Prospective Analysis Tools: Strategic Position and Action Evaluation (SPACE) Analysis

A SPACE Analysis is an attempt to quantify the level of environmental stability, the industry's strength that the organization operates within, and to factor in the organization's financial strength and competitive advantage (Ginter et al.). Like the TOWS, a SPACE Analysis helps identify a directional strategy for the organization. Misuse of the SPACE Analysis tool is similar to the misuse of a Porter's Analysis; the analyst tends to overreach the applicability of the tool. As with the Porter's Analysis, incorporation of the SPACE Analysis of a Fort Greely telemedicine system will be carefully considered.

Appendix G shows the SPACE Analysis for Fort Greely

telemedicine. The analyst assigns a numerical value, zero through six with higher being better. In order to plot the results on a graph, Environmental Stability and Financial Strength of the organization analyzed are converted to negative numbers; Industry Strength and Competitive Advantage are positive numbers. An average of the rating given for each of the four major areas is gained, and the results plotted. The highest absolute number where the two of the four areas converge into a quadrant suggests the approach the organization should take (Aggressive = Industry and Financial Strength Quadrant, Defensive = Competitive Advantage and Environmental Stability, Competitive = Environmental Stability and Industry Strength, and Conservative = Competitive Advantage and Financial Strength).

Post-Strategic Analysis Steps

Appendix H depicts an Alternatives Analysis for the Fort Greely telemedicine program. An Alternatives Analysis seeks to generate courses of action (COAs) based on the previous steps in the strategic analysis. The analyst selects several, usually three or more, action plans that incorporate aspects of the strategic analysis (Ginter, Swayne, & Duncan, 1998). The analyst then develops criteria to compare each COA against. Common criteria include how well the alternative meets the organization's mission, vision and goals, cost effectiveness, and how well it supports the strategies recommended by other tools used in the strategic analysis.

The analyst may also assign a weight to each criterion to stratify their relative importance. This allows for a more

precise assessment than rating an alternative with no weight. Alternatives are rated on a scale, higher is usually better, then multiplied by the weight assigned for each criterion. The scores of each alternative are totaled resulting in a preferred course of action.

After the strategic analysis is finalized, a business case analysis (BCA) of deploying telemedicine to Fort Greely will be completed. Like any potential business venture, analysis of implementing telemedicine at Fort Greely from a capital investment perspective should reveal a solid return on investment (ROI). Two common types of capital investment analyses are the payback method and net present value (NPV) (Ross, Westerfield, & Jordan, 2000). The payback method is a fairly straightforward technique that compares the cash inflows over a set period of time against the expenses accrued during that phase of the project. The point at which revenue has cumulatively matched expenses the project is said to have broke even. Payback is considered essentially flawed for two major reasons: 1) It does not factor in the time value of money: a dollar today is worth more than a dollar tomorrow and 2) It uses an arbitrary cut-off point as mentioned previously for when an investment must break even. Because of these limitations its usefulness is constrained to shorter projects that are relatively minor in scope; the Payback method will not be used for this study (Ross et al.).

Net present value (NPV) attempts to ascertain the difference between the investment's market value (cumulative value

discounted over time) and the expenses associated with the project (again, discounted over time). The procedure for this method is to capture the in and out flows of cash over the life of the project using an appropriate discount factor, and subtract the discounted expenses from the discounted revenues. If the NPV is zero or greater the project is considered acceptable (Gapenski, 2001). As NPV is the preferred method for projects with durations longer than a few years (Ross et al.), it is the chosen financial analysis tool for this project.

Appendix I depicts the results of NPV calculations, using Micosoft Excel's Function Wizard for the total discounted cashflows for each example, and the formula for each year's contribution to the total taken from Gapenski (2001). Examples of both a positive NPV and negative NPV are shown. Note that if revenues and expenses remain constant over the life of the project, initial expenses and reimbursements way heavily into whether or not the project has a positive NPV.

To capture relevant deployment and implementation expense data, information from a variety of sources is needed. Data indicating deployment expenses, which include hardware purchased, deployment team travel, and software expenses of needed telemedicine carts will be gained from the AFHCAN Project Office (AFHCAN Project Office, 2002). Referral patterns for Dr. Andreassen's DoD patients will be acquired, and expected increases in population factored in; the Managed Care Division will provide this data. Telemedicine cart training expenses will be estimated for providers, nurses, and ancillary staff who

would be a part of the referral network.

Data from Tripler Army Medical Center's telemedicine initiative will be used to estimate the number of consults that would be best aligned with telemedicine methods (Davis, 2001). A MEDDAC-Alaska provider panel will verify estimates for Fort Greely patients gained from using Tripler's research.

Cost-avoidance for recaptured referrals is not easily projected, nor is it relevant under the current Tricare Managed Care Support contract. Tricare Refinancing Initiatives propose apportioning the Tricare Management Agency budget for beneficiary care out to each medical activity. In this new way of doing business, facilities would no longer be able to tap into a large pool of funds for care referred outside the organization.

MEDDAC-Alaska, and other organizations, will receive a budget for Tricare expenses based on the population served and would manage it locally. Treating patients at MEDDAC-Alaska clinics instead of civilian medical facilities could save money (R. Newcombe, Personal communication, March 4, 2003; W. Hinger, Personal Communication, April 10, 2003). Research supports the use of cost-avoidance in telemedicine programs in addition to revenues to gage the break-even point (Buker, 1997).

Medicaid legislation in Alaska now allows for billing of telemedicine-delivered services (Halterman, 2002). Due to the complexity of third party collections for telemedicine consults by specific type, and Dr. Andreassen's mix of DoD and civilian beneficiaries, an analysis of potential revenues will not be

attempted. This may be possible after the Fort Greely telemedicine program is more mature and further research is conducted.

The difference between projected discounted expenses and expected discounted revenues will determine whether or not implementing telemedicine at Fort Greely makes financial sense. Non-financial benefits/detractors must then be accounted for over a one year period: provider time away from the hospital, patient loss of duty days while physically visiting MEDDAC-Alaska facilities, and quality of diagnoses are all non-financial variables that must be factored in to the final assessment.

Equipped with the results of these analyses, a final recommendation to the hospital leadership can be made. Included in this recommendation are the additional products (key personnel list, phased timeline chart, AFHCAN expertise point of contact list, etc.,) mentioned previously to provide the hospital leadership enough information to get the telemedicine project progressing forward. Periodic modifications based on changing factors will be necessary but are not a part of this project paper.

Reliability and Validity

To help ensure reliability, operational definitions for various aspects of the strategic analysis tools will be delineated, steps outlined in Ginter et al. annotated and adhered to, calculations where required by the tool used (strategic analysis or BCA) kept in digital and unaltered

format, and all data sources documented. These results will be compared against Department of Defense established data for expense guidelines (Speedy, Young, Velthuis, & Harvell, 1996). A provider panel will review the estimate of teleconsults for Dr. Andreassen's referrals compared to the research from Tripler Army Medical Center's telemedicine program (Davis, 2001).

To help maintain validity, MEDDAC-AK leadership will review the results of strategic analysis tools for thoroughness. They will compare the author's results against already developed strategic analyses of the organization. Finally, data on costs and reimbursement rates will be matched against external or industry standards, using research from Speedy et al. (1996).

Results

Introspective strategic analysis tools revealed an organization that is capable of supporting a telemedicine program at Fort Greely. Prospective strategic analysis tools lead to an aggressive stance for implementing telemedicine. An analysis of three deployment courses of action suggests that either an AFHCAN and Commercial Off the Shelf (COTS) hybrid, or a pure COTS system would best serve the organization. A simple business case analysis resulted in a break-even point using the NPV method at five years for 473 beneficiaries served; for the expected population of 300 the project loses $117,505.48 over the same period.

The start of a strategic analysis requires a deductive reasoning approach; one must move from the general to the specific. The SWOT tool was completed first because it serves

as a baseline and provides insight when using other analysis tools. Conducting a Situational Analysis is a good next step because it has overlap with the SWOT but broadens the perspective by including environmental factors. The Stakeholders, Value Chain and Porter's Analyses can be done at this point in any order. They provide a snapshot of those impacted by the organization or project within a framework of the services provided, and assess the level of impact.

Prospective analyses then take the baseline assessment and map out a recommended directional strategy for the organization. A TOWS Matrix is a solid tool, but is more meaningful if a SPACE Analysis is included. These two tools can intersect in terms of specific adaptive strategies to take. Where their recommendations coincide indicates viable avenues for an organization to head off in.

An Alternatives Analysis provides an organization tangible courses of action (COAs). When the COAs for the Fort Greely telemedicine project were developed, an attempt was made to keep them simple and not restrictive. This ensures flexibility in deployment options yet still allows for an assessment of each COA against criteria. Much of the criteria selected are recommendations from Field's (1996) text on assessing telemedicine programs. However, some criteria were selected that are specific to a deployment concept that is still a work in progress. These criteria are addressed in more depth in the Discussion portion of the paper.

A Business Case Analysis (BCA) is well-suited to benchmark

return on investment. While some research has suggested that telemedicine saves organizations funds (Cornwell, 1995) in many cases monetary returns will be less than expenditures. Because non-monetary returns are difficult to quantify, a simplistic approach to the BCA was taken. In the case of Fort Greely, monetary values are superseded by access to care issues. Results of a BCA are more anecdotal than useful for justification of deploying telemedicine to Fort Greely.

Introspective Strategic Analysis: SWOT

The SWOT tool's strengths, weaknesses, opportunities, and threats highlights are summarized below (See the full SWOT at Appendix A).

Strengths: MEDDAC-Alaska already has most equipment available and deployed to support a Fort Greely telemedicine program. Both the Family Medical Clinic and MEDDAC leadership desire telemedicine. MEDDAC has recently established an Informatics Advisory Council to handle clinical integration of information systems (See Appendix J). AFHCAN budget funds are substantial for equipment deployment and personnel training.

Weaknesses: MEDDAC's telemedicine program is underdeveloped. The AFHCAN system is quasi-proprietary. There are multiple Information Systems initiatives vying for provider attention.

Opportunities: Fort Greely is the subject of increased attention by senior officials. The new BACH hospital project provides equipment and fund opportunities for a Fort Greely telemedicine program. Commercial Off the Shelf (COTS) software

and hardware is available to extend services provided by a Fort Greely telemedicine program.

Threats: Sustainability and continuance of MEDDAC-dedicated AFHCAN funds is not certain. Telemedicine must be accepted both by patients and providers. The AFHCAN Project Office focuses the majority of their effort into native tribe sites or new equipment and program initiatives.

Introspective Strategic Analysis: Situational Analysis

The Situational Analysis tool assessed the environmental, market, and organizational factors involved in a Fort Greely telemedicine deployment. Key results of this analysis are summarized below (See Appendix B for full results).

Environmental Factors (Size): The population at Fort Greely, Delta Junction, and the surrounding area is expected to increase over the next 6-24 months. MEDDAC has a total of six AFHCAN carts; five carts are already deployed within the organization.

Environmental Factors (Nature of Competition): The isolation of the area results in essentially zero competition for the Family Medical Clinic in Delta Junction. Specialty referral types available are limited.

Environmental Factors (Macro Environmental Factors): Medicaid reimbursement is now approved for Alaska regardless of method of healthcare delivery.

Market Factors (Customers): The influx of expected contractors at Fort Greely may or may not be Department of Defense (DoD) beneficiary eligible. The known DoD beneficiaries that are expected to arrive are Active National Guardsmen and

their families.

Market Factors (Services): Fairbanks Memorial Hospital (FMH) can handle the same level of specialty care as MEDDAC.

Market Factors (Geographic Service Area): It is likely that MEDDAC will need to add a medical clinic to Fort Greely within 18 months.

Market Factors (Marketing): No plan for marketing of telemedicine at MEDDAC exists.

Market Factors (Demographics): National Guardsmen tend to be an older population than regular active duty soldiers.

Organizational Factors (Mission): Family Medical Clinic provides urgent and family primary care to Delta Junction and the surrounding area. Fort Greely's missile defense mission is being handled by active National Guardsmen.

Organizational Factors (Culture): The organizations involved have learned to provide the best care possible within the constraint of limited resources.

Organizational Factors (Marketing Strategies): Web sites are not leveraged by any of the participating organizations. Family Medical Clinic in Delta Junction does not have a web presence.

Organizational Factors (Finance): Tricare reimbursement funds will not be centrally managed soon. Family Medical Clinic has a limited budget. AFHCAN funds for MEDDAC telemedicine are large, but cannot be used for ongoing expenses.

Organizational Factors (Information Systems): BACH has earned the award "100 Most Wired Hospitals" (Solvny, 2002). The Information Management Division at BACH spends significant

effort deploying mandatory Information Systems to the organization. Family Medical Clinic has dialup and a proprietary broadband connectivity.

Introspective Strategic Analysis: Stakeholder's Analysis

The Stakeholder's Analysis tool assessed those agencies and entities that would be affected by a telemedicine deployment to Fort Greely. The key result of this analysis is a Fort Greely telemedicine deployment will directly affect Fairbanks Memorial Hospital (See Appendix C for full results).

Introspective Strategic Analysis: Value Chain Analysis

The Value Chain Analysis tool combined organizational factors with a rough life cycle of services provided by Family Medical Clinic. The key factor highlighted by the Value Chain analysis, and not covered fully in other assessments, was the establishment of Informatics Advisory Council at MEDDAC-Alaska (See Appendix D for full results).

Introspective Analysis: Porter's Analysis

The Porter's Analysis tool assessed the external factors that would influence a Fort Greely telemedicine deployment. Key results of this analysis are summarized below (See Appendix E for full results).

Potential Entrants: The likelihood of a new entrant to the Delta Junction healthcare market is low.

Buyers: The power of the Family Medical Clinic to influence how, what, and when telemedicine is deployed is high. Fairbanks Medical Clinic will have some influence on the sustainability of a Fort Greely telemedicine program.

Substitutes: Existing practices for sending consults are entrenched.

Suppliers: AFHCAN will have influence directly proportional to how much of their equipment is used and how reliant on the AFHCAN system the telemedicine program at Fort Greely is to process consult requests.

Prospective Analysis: TOWS Matrix

The TOWS Matrix tool aligned organizational strengths, weaknesses, opportunities and threats and suggests a Future Quadrant directional strategy. The Future Quadrant consists of Related Diversification, Vertical Integration, Market Development, Product Development, and Penetration (See Appendix F for full TOWS Matrix results; Appendix K for definitions of Adaptive Strategies).

Prospective Analysis: SPACE

The SPACE Analysis tool assessed the environmental stability, industry strength, competitive advantage, and financial strength of MEDDAC in terms of supporting a telemedicine deployment. The formulae from these areas resulted in a recommendation of an Aggressive directional strategy. An Aggressive strategy includes Related Diversification, Market Development, Product Development, and Vertical Integration. All four of these adaptive strategies coincide with the results of the TOWS Matrix (see Appendix G for full results of the SPACE; Appendix K for definitions of Adaptive Strategies).

Alternatives Analysis

Three courses of action (COAs) were formed to represent

deployment options for Fort Greely telemedicine. Course of Action 1 (i.e., Alternative One) was an AFHCAN Only deployment scenario. Course of Action Two was an AFHCAN and COTS Hybrid deployment. Course of Action Three was a COTS Only deployment package. Course of Action 3 (COTS Only) scored best when all criteria were included; Course of Action 2 (AFHCAN and COTS Hybrid) scored best when those criteria judged most important were the only ones considered (See Appendix H for the complete results of the Alternatives Analysis).

Business Case Analysis

A Business Case Analysis (BCA) was conducted using data that were available. Some assumptions were made to derive the Net Present Value (NPV) of cash flows for deploying telemedicine to Fort Greely. The expense included for the project was connectivity charges, depicted in Table 1. Projected expenses for the project were annualized to compare with revenues and available referral data from the Family Medical Clinic.

Table 1.

Fort Greely Telemedicine Estimated Expenditures

Projected Expenditures			
Expense	Duration		Annual Total
Connectivity Charges	Monthly	$8,839.00	$106,068.00

Source: Bassett Army Community Hospital (2002)

Revenues (i.e., cost avoidance) for the project were estimated using the Tricare Management Agency online statistical

report system (Tricare Management Agency, 2002); these figures are displayed in Table 2. Inpatient and outpatient costs per patient were computed for Fiscal Year 2002 to arrive at an average cost per patient per visit. An average inpatient length of stay (LOS) of 4.4 days was used to normalize the data into per-visit form similar to an outpatient encounter.

Table 2.

Fort Greely Telemedicine Estimated Cost Avoidance Figures

Projected Cost Avoidance Per Visit				
Type of Visit	Patient Cost	Government Cost	LOS	Total
Inpatient	$160.77	$903.66	4.4	$4,683.49
Outpatient	$31.20	$118.15	N/A	$149.35
Per Diem		$76.50	N/A	$76.50

Source: Tricare Management Agency (2002); GAO (2003)

The data mining of the Family Medical Clinic's referrals to BACH resulted in a total of four cases over a period of two years. With eight beneficiaries, this converts to a 25% referral rate per beneficiary per year. Results from research at Tripler Army Medical Center suggest that 36% of referrals can be avoided if telemedicine is implemented (Cornwell, 1995). Applying this model to a Fort Greely telemedicine program factors to 9% referrals avoided per beneficiary per year.

A discount rate of 3% was assumed to reflect the time value of money for an extended period. When all data are included in NPV equations the telemedicine project will lose $117,505.48 over a five-year period with the expected beneficiary population

of 300. In order to break even the supported population needs to be 473 or greater for the same period (See Appendix I for complete results).

Discussion

The strategic analysis process brought out some important factors to consider when assessing a Fort Greely telemedicine deployment. While many of the introspective analysis tools have overlap in coverage, the analyst's perspective for each tool is different. The prospective analysis tools were highly consistent with each other, resulting in an aggressive posture for the organization to take. Due to assigned weights each alternative was distinctive, this resulted in a clear numerically superior alternative. However this alternative, a COTS Only deployment, may not be the best fit for MEDDAC.

SWOT: Internal Strengths

If the chosen telemedicine equipment includes the AFHCAN system MEDDAC already has a cart, server, and software package set aside for Fort Greely. Contrary to deployment documents from the AFHCAN Project Office (AFHCAN Project Office, 2002) telemedicine carts were not arrayed as planned. One complete system remains in the MEDDAC supply warehouse, on a pallet and still shrink-wrapped. This is a boon for an AFHCAN deployment scenario as all is ready to ship to Fort Greely with no modification. It also will make start up costs much less for the organization than purchasing new equipment, either from AFHCAN or otherwise.

Another strength for the organization is the support of the

leadership at MEDDAC and at the Delta Junction Family Medical Clinic. Recent interest by Tricare leadership underscores that deployment of telemedicine to Fort Greely is a matter of when, and not if.

MEDDAC has begun to realize that clinical oversight of Information Systems (IS) is crucial to their success. It has recently formed an Informatics Advisory Council and a part of the charter for this council is to tackle the Fort Greely telemedicine project (see Appendix I).

Finally, MEDDAC has a large budget in AFHCAN coffers to tap into. This budget is not tied to the MEDDAC annual operating budget, nor does it 'evaporate' at the end of each fiscal year. With the autonomy that each partner in AFHCP has, these funds allow flexibility of buying the equipment that the organization feels fits its need. While this fund is not available for ongoing expenses such as connectivity charges, it does allow MEDDAC to deploy new and innovative technologies.

SWOT: Internal Weaknesses

MEDDAC's telemedicine program has been on hiatus for multiple reasons. It is safe to say that the program never got a start, and exemplifies what the Information Management Division (IMD) jokingly calls a "drive-by deployment." MEDDAC must fix the internal processes surrounding telemedicine before it can look outward to a Fort Greely deployment. The Informatics Advisory Council is a good start, but the organization is fighting an uphill battle.

AFHCAN's system is quasi-proprietary and this poses a

significant problem for ongoing utilization. All teleconsults would have to flow through a stand-alone cart and referral system. The AFHCAN system is not designed to handle anything other than AFHCAN consults or billing for those consults. This adds yet another IS that providers must factor into their practice patterns.

Finally, telemedicine would be one of several newly deployed systems. Since December 2002 the following systems have been deployed to MEDDAC-Alaska: the Integrated Clinical Database (ICDB) and Tricare Online (TOL). Pending deployment is a new graphical interface for the Composite Healthcare System (CHCS), CHCS II, and an upgrade to Windows XP for the organization. All of these deployments will or have occurred within a 12 month time frame. Clinicians, due to the volume of other new information systems, could marginalize telemedicine.

SWOT: External Opportunities

A Fort Greely telemedicine program is viewed as important by leadership. Senior officials in the Tricare Lead Agent office are increasingly aware of a Fort Greely telemedicine program (W. Hinger, personal communication, 10 April 2003). This attention by leadership represents the prospect of leveraging a deployment to assist other initiatives MEDDAC is considering.

The new BACH hospital project is a prime opportunity for MEDDAC and a Fort Greely telemedicine program. It is a chance to match what is deployed to Fort Greely with those systems that are planned for implementation in the new BACH. It also gives MEDDAC an opportunity to test out potential systems that

represent the future of healthcare delivery. It can be a method from which the proprietary nature of AFHCAN is mitigated. AFHCAN is embedded in the current hospital structure, it is not yet so in the new BACH.

Commercial Off the Shelf (COTS) programs can be capitalized on. There are some desired capabilities that AFHCAN cannot do (such as web-based viewing of DICOM compliant images). Using COTS programs as a part of the Fort Greely telemedicine system could improve utilization and help sustain the program's life cycle.

SWOT: External Threats

The continued availability of AFHCAN funds dedicated to MEDDAC is unknown. On occasion AFHCP partners and committee members have made statements as to the size of MEDDAC's 'war chest' (roughly $400,000), implying that it could be used better elsewhere. A Fort Greely telemedicine program would help fight off attempts to reallocate those funds.

A very real threat to the success of a Fort Greely telemedicine project is the acceptance of providers and patients. The Informatics Council may assist with the former, and a solid marketing plan may assist with the latter. In either situation there must be perceived value to the system for users to support it.

Finally, the AFHCAN Project Office has mostly focused their efforts in two areas. The first area makes perfect sense; the Alaskan Native Tribe Healthcare Consortium is their largest customer with the most remote sites. The second area, expansion

of the AFHCAN system into other locales and other services (i.e., teledentristy), consumes tremendous organizational energy. Those sites that do not fall into either of those two categories are largely left to their own devices. As a result, MEDDAC may have to serve as the de facto exclusive maintainers of the telemedicine system. This adds credence to not deploying an AFHCAN Only telemedicine system.

Situational Analysis: The Environment (Size)

The current DoD beneficiary population in the Fort Greely area is eight Tricare Prime Remote patients. There is an expected influx of 300 soldiers and family members to the Fort Greely because of BMDO. The impact of this increase in population size is immense. Some of the soldiers and family members are projected to arrive in 6-8 months. This feeds a sense of urgency to augment the Family Medical Clinic (FMC) in Delta Junction until other measures can be taken. Telemedicine is one option. The increased numbers will also drive how much and what type of telemedicine equipment to deploy.

With just five telemedicine carts available to deploy intra-BACH (with one for Fort Greely) it may mean that more carts are needed to replicate likely FMC referral patterns in the organization. The alignment of carts against specific clinics in BACH will also need scrutiny. An option to deploy AFHCAN or other COTS software to separate Points of Presence (POPs) in MEDDAC if a cart is not necessary is an option.

Situational Analysis: The Environment (Competition)

Due to geographic isolation the Family Medical Clinic could

expect to have close to zero competition for some time. This should alleviate any issues of 'anti-competition' when MEDDAC deploys telemedicine to the clinic. It should also help sustain the FMC even if a competitor does show up: the newcomer would not have the added value of the telemedicine infrastructure.

Since specialty referral types are not exhaustive at either BACH or Fairbanks Memorial Hospital, it is possible that consults might be sent elsewhere. A telemedicine system deployed by MEDDAC to FMC would establish an arrangement that help keeps consults within the system.

Situational Analysis: The Environment (Macroenvironment)

Alaska now reimburses via Medicaid for teleconsults (S. Ferguson, Personal Communication, 4 April 2003). The law allows for consult reimbursement regardless of the mode of delivery. This opens the door for third party reimbursement and could result in greater adoption of telemedicine at Fort Greely. It also suggests that the telemedicine system deployed to the Family Medical Clinic needs to be usable for non-DoD beneficiaries for FMC to consider it fully practical.

Situational Analysis: The Market (Customers)

The imminent arrival of contractors to build up Fort Greely may or may not be DoD healthcare eligible. This leaves the numbers supported as an unknown. What is certain is that the increase in population will have a direct impact on FMC's ability to provide care for the area.

The DoD beneficiaries will be Active Guardsmen with their families. It is expected that this demographic group will

utilize healthcare at a higher rate due to their older age.

Situational Analysis: The Market (Services)

Many of the services provided to the area by MEDDAC are also provided by FMH, and more or with larger capacity. This suggests that the Family Medical Clinic in Delta Junction will want to have a telemedicine system that can interact with both MEDDAC and FMH. It also indicates that MEDDAC may need to take steps to remain competitive with FMH for consults.

Situational Analysis: The Market (Geographic Service Area)

Because of the size of anticipated population increases MEDDAC may be compelled to establish a clinic on Fort Greely within 18-24 months. Deployment plans must allow for a Fort Greely clinic. These plans should address an 'exit strategy' for if/when/what is pulled out of the Family Medical Clinic and established at the MEDDAC clinic on Fort Greely.

Situational Analysis: The Market (Marketing)

The organizations involved should highlight how access to care will improve for their patients. A marketing plan should be an integral part of deployment and not an afterthought. As mentioned before, patient buy-in is crucial to the success of any telemedicine program.

Situational Analysis: The Market (Demographics)

National Guardsmen tend to be older than active duty soldiers. This suggests that the population will need more medical care and of a different mix than a younger cohort of beneficiaries.

Situational Analysis: Organization (Mission)

The Family Medical Clinic provides urgent and family care to Delta Junction and surrounding areas. Although the sole source of medical services in the area, it still must operate as a business and fiscal issues likely drive many decisions in the clinic.

Fort Greely's missile defense mission is being staffed by active National Guardsmen. This poses a problem for MEDDAC; it is uncertain if the National Guard will be federalized for this mission. If not, additional resources to cover their medical support may not be forthcoming.

Situational Analysis: Organization (Culture)

Organizations that would be a part of a Fort Greely telemedicine network are used to doing the best they can with the resources they've got. They are familiar with referring patients to other facilities so telemedicine consults may not be difficult to adapt to.

Situational Analysis: Organization (Marketing Strategies)

Web sites of organizations are largely static and do not promote fully what the organization is doing for the public. This is particularly true of AFHCAN (www.afhcan.org), but also applies to the Family Medical Clinic in Delta Junction: it has no web presence. For little effort and even less funds organizations can improve their marketing campaigns by leveraging the Internet.

Situational Analysis: Organization (Finance)

The Tricare Management Agency may not disburse funds for

care outside military medical treatment facilities soon. It is speculated that these funds would be apportioned out to organizations and they would manage them locally. By managing the funds more efficiently MEDDAC could realize a cost savings, and this is the basis for the BCA cost avoidance figures.

Family Medical Clinic has a limited budget. As mentioned before, FMC operates as a business. Any deployment plan cannot factor in much assistance from FMC, if at all.

AFHCAN funds for MEDDAC-Alaska are large, but cannot be used for ongoing expenses. Funds for connectivity, or to hire an in-house programmer to develop MEDDAC-custom tools for a telemedicine program will come out of the operating budget. The large fund pool also suggests that MEDDAC come up with a 'spending plan' soon to preclude these resources from being absorbed by other AFHCP partners.

Situational Analysis: Organization (Information Systems)

MEDDAC has earned the award "100 Most Wired Hospitals" for three years running (Solovny, 2002). The inclusion of a telemedicine program will help sustain earning this prestigious award. It can also tie into the organization's overall marketing plan.

The Information Management Division (IMD) spends a significant effort deploying mandatory information systems to the organization. This leaves little resources for projects that are not mandatory but desired by the organization. Telemedicine will be an uphill fight with providers and patients, it will also be for the IMD.

The Family Medical Clinic in Delta Junction has dialup connectivity. It also has broadband capabilities via satellite, but this connection, at the time of this writing, is not able to work with any other systems than a proprietary pharmaceutical ordering process. The AFHCAN system is highly dependent on bandwidth speed (S. Ferguson, Personal Communication, 13 March 2003). Slower connection speeds place an AFHCAN Only deployment scenario in jeopardy of success.

Stakeholders Analysis

Fairbanks Memorial Hospital is a key stakeholder for a Fort Greely telemedicine program. Their initial involvement will likely be nil, nor are there plans to seek their approval to deploy telemedicine to Fort Greely. However, if referrals are shifted to BACH in lieu of FMH they will certainly notice at some point. MEDDAC should bring FMH into the process as soon as practical. This may alleviate misunderstandings about competition later, or preclude some sort of 'tit-for-tat' reaction.

Value Chain Analysis

With the formation of an Informatics Advisory Council MEDDAC can now manage a telemedicine program from pre- to post service delivery. Perhaps no other entity within MEDDAC is suited to handle this mission, or do it as effectively.

Porter's Analysis: Potential Entrants

Barriers to market entry for competitors is high. The entrenched nature of FMC, limited population growth excluding military, and low profit margins will likely ensure few

organizations willing to compete with the Family Medical Clinic. This stability should be factored in, with plans developed for a telemedicine program in the Delta Junction area for an extended period.

Porter's Analysis: Buyers

Family Medical Clinic's power in deciding what, when, and how much telemedicine is deployed should not be underestimated. Since it has operated without telemedicine for several years it has developed a system of referrals that uses other methods. Fairbanks Memorial Hospital (FMH), the sleeping giant in the equation, must be factored in as well. MEDDAC should not consider 'if' FMH gets involved, but should try to predict 'when' and adjust plans accordingly.

Porter's Analysis: Suppliers

AFHCAN's influence is directly proportional to how much of their equipment is a part of the telemedicine system deployed. At times, due to their other priorities, it is difficult to get basic information from AFHCAN. This includes requests for information directly related to a Fort Greely telemedicine deployment. MEDDAC must be persistent in getting necessary information from AFHCAN; this is especially true if an AFHCAN Only scenario is chosen. If MEDDAC leadership feels feedback will be slow in coming, they should take steps to deploy only necessary AFHCAN equipment.

TOWS Matrix

An alignment of the strengths, weaknesses, opportunities and threats revealed a strong tilt towards the Future Quadrant

directional strategy in the TOWS Matrix. The Future Quadrant is the intersection of Strengths and Opportunities. Recommended adaptive strategies of a Future Quadrant are Related Diversification, Vertical Integration, Market Development, Product Development, and Penetration. (An overview of key definitions for the project is found in Appendix K; see Appendix F for the complete TOWS Matrix).

TOWS Matrix: Adaptive Strategies

Related diversification is an adaptive strategy where the organization adds a new related product or service category (Ginter, Swayne, & Duncan, 1998). An example of related diversification for the Fort Greely telemedicine program might be the inclusion of scanning of radiographic film to a digital format for viewing by a radiologist at BACH. It also might encompass including other services via telemedicine such as applications that have medical back office uses (e.g., business applicability).

Vertical Integration is an adaptive strategy that looks to add new members along the distribution channel, either towards a later planned stage of implementation, or an earlier stage overlooked (Ginter, Swayne, & Duncan, 1998). For the Fort Greely telemedicine program, vertical integration may include deploying telemedicine to Madigan Army Medical Center.

Market development is the adaptive strategy that suggests expansion of present products or services into new geographic markets or to new segments within a present geographic market (Ginter, Swayne, & Duncan, 1998). An example of market

development might be deploying telemedicine to Fairbanks Memorial Hospital, or tying the Stryker Brigade medical system into the MEDDAC telemedicine program.

Product development is the adaptive strategy that seeks to extend the existing life of a present product line, or improve on present services (Ginter, Swayne, & Duncan, 1998). In terms of the Fort Greely telemedicine project, it represents an opportunity to revitalize the existing telemedicine system. It also allows MEDDAC to reinitiate its telepathology system that has fallen into disuse.

A Penetration adaptive strategy looks to increase market share for present products or services in present markets through marketing efforts (Ginter, Swayne, & Duncan, 1998). An example of this for Fort Greely might be to deploy a system that is flexible enough that the Family Medical Clinic in Delta Junction forgoes consults to FMH for DoD beneficiaries completely.

SPACE Analysis

A Strategic Position and Action Evaluation, SPACE, assesses the organization in terms of four domains: Environmental Stability, Industry Strength, Competitive Advantage, and Financial Strength. Using a scale of 0 to 6 the analyst judges aspects of each domain and comes up with a score. Domains are paired, with scores combined. The paired domains with the highest absolute score indicate the recommended adaptive strategy (see Appendix K for definitions of adaptive strategies; Appendix G for the SPACE Analysis).

Because of the significant amount of funds available, low risk involved, and relative ease of exit from the market, a Fort Greely telemedicine scored highest in the Financial Strength Domain. Environmental Stability scored next highest because of low competitive pressure, and high barriers to market entry.

These two domains combined result in a recommendation of an Aggressive directional strategy. Similar to the TOWS Matrix, an Aggressive directional strategy for the SPACE Analysis includes Related Diversification, Vertical Integration, Market Development, and Product Development. It is not always the case that an analysis results in a direct correlation between the TOWS and SPACE tools. However, adaptive strategies that do overlap are considered the best fit for an organization.

Alternatives Analysis

Courses of action (COAs) were developed to establish deployment options for MEDDAC and FMC leadership. Course of Action 1, an AFHCAN Only alternative, is a system consisting of only AFHCAN carts, software, and network connections already available to MEDDAC. Course of Action 2, an AFHCAN and COTS Hybrid, includes some AFHCAN equipment, software, and connectivity but also contains a 'best of breed' from commercial technologies. Course of Action 3, a COTS Only alternative, was established to leverage the latest innovations in telemedicine technologies. For clarity of assessment a multifaceted COTS program, Groove (http://www.groove.net) was used. An overview of this program is found in Appendix M.

Evaluation criteria were established to assess each COA for

suitability. The analyst can assign weights to each criterion to stratify them in order of importance. Established weights ranged from 1, least important, to 3, most important. A weight of 2 was considered normal. Criteria definitions are covered in Appendix H.

Each COA is assessed a raw score to allow for a more precise analysis. A scale of 1 to 5 was used for this analysis, with higher (5) being better. Raw scores are multiplied by assigned weights for each criterion coming up with a weighted score for that COA. The COA with the greatest total score on all criteria is usually considered the best alternative.

This conclusion may not hold true for MEDDAC and the Delta Junction Family Medical Clinic. With all criteria included, a COTS Only deployment option scores best. However, if the analyst only includes the top rated criteria, those with a weight of 3, then Course of Action 2 has the highest score. Note that Course of Action 2, an AFHCAN and COTS Hybrid, still ranks second best when all criteria are included.

Under no scenario was an AFHCAN Only alternative the top choice. It ranks highly for political acceptance, low costs, and maintenance but lags when considering scalability and flexibility, transitioning to a MEDDAC clinic at Fort Greely, and usefulness for business applications. An AFHCAN Only telemedicine system may be too restrictive for MEDDAC to capitalize on its use.

Business Case Analysis

An analysis of the cost effectiveness of telemedicine

becomes an exercise in assumptions. For the purpose of deciding to deploy telemedicine to Fort Greely, a BCA is essentially irrelevant. The involved leadership has decided it will happen, and it is now a matter of how, what, and when. However, it is useful to analyze easily quantifiable expenses and revenues (i.e., cost avoidance) to serve as a baseline for further study.

To allow applicability for all three alternatives the only expense included was monthly connection charges for the dedicated T1 line. Because MEDDAC has an ongoing contract with AT&T Alascom, these charges are assumed to remain constant. No attempt was made to calculate salaries of personnel who might assist in deploying telemedicine. Other potential expenditures were also discarded because of the unknown nature of which COTS technologies might be included, how much, etc. The cost of AFHCAN equipment and software is known but was not considered as MEDDAC has already paid for them. Sunk costs are irrelevant for future financial decisions.

Assessing cost avoidance by calculating referrals that would <u>not</u> require a patient visit to MEDDAC facilities is a more difficult task. Personnel in MEDDAC's Managed Care division were surprised at the lack of data; there were only four referrals over a period of two years. A provider panel 'pouring over' four referrals would not result in useful formulae for physical visit avoidance percentages. Further computations would result in either a 0%, 25%, 50%, 75% or 100% referral avoidance basis.

However, a per-beneficiary visit to BACH per year can be

determined. Department of Defense beneficiaries in the Fort Greely area were sent to BACH at a rate of 25% annually (8 beneficiaries with 4 visits over 2 years). This rate was multiplied against the expected population total of 300, then multiplied by the physical visit avoidance factor, 36%, from Cornwell's (1996) study at Tripler Army Medical Center (TAMC). A 36% physical visit avoidance for the Fort Greely area may be a conservative number. It is probable that a medical system such as TAMC and its outlying clinics could handle more cases internally than a remote clinic such as the Delta Junction Family Medical Clinic.

Costs per visit were taken off the Tricare Management Agency website (Tricare Management Agency, 2002). Outpatient total costs per visit were included in the BCA with no modifications. However, inpatient visits had to be converted to a per-visit total. This was accomplished by multiplying the average Length of Stay (LOS) and the total cost per patient per day for an inpatient visit. Total costs for both inpatient and outpatient visits were added, then averaged to arrive at an estimate for an average per visit cost. Daily meal rates and incidental per diem for the Fairbanks area were included in cost avoidance numbers (GAO, 2003).

To perform a better estimate of true costs and cost avoidance, the Fort Greely telemedicine program managers will need to track related expenses and all teleconsults. A periodic review of teleconsults by a panel of clinicians could determine a more accurate assessment of physical visits avoided.

There are multiple variables that would change the results of the BCA. These include the type and scope of telemedicine deployed to Fort Greely, the actual number and type of consults used over the system, the involvement of Fairbanks Memorial Hospital, and even the provider panel's agreement on which consults eliminated the need for a physical visit to MEDDAC facilities. Nailing down all variables would benefit all parties involved.

Note that the BCA does not include cost avoidance for non-Fort Greely beneficiaries served by MEDDAC's telemedicine system, but it does include the connectivity charges for the entire network. Under an 'if you build it, they will come' philosophy it is hoped the MEDDAC telemedicine system can be used to reduce costs for beneficiaries not at Fort Greely.

Conclusions

Analysis of the three courses of action showed that deployment of a combined AFHCAN and COTS telemedicine system is best. A simple BCA indicates a break-even point at five years for 473 beneficiaries. Projected losses over that same time period for the expected population of 300 beneficiaries is $117,505.48.

Recommendations

The strategic analysis suggests the following steps to establish a telemedicine program with a potential for success.

1. Designate a telemedicine coordinator for the organization. Empower this individual to oversee all aspects of the project.

2. Leverage the Informatics Advisory Council for expertise on system requirements, consult reviews, goals and objectives for the program, future geographic areas and services for expansion, and other management issues requiring clinical input.

3. Develop and implement a comprehensive marketing plan. Include in this campaign plans to maximize the capabilities of the Internet (i.e., web sites) and/or establish a web presence if the organization is not online.

4. Reestablish MEDDAC's own telemedicine program before deploying any system to Fort Greely. Include provider training, an assessment of necessary consult POPs, and deploy any COTS software or equipment internally first to run pilot tests.

5. Develop measures for success and establish monitoring systems that allow tracking of progress. The Balanced Score Card (BSC) method is helpful here. Metrics of success should be aligned with the four domains of the BSC: Financial, Internal Processes, Learning and Growth, and Customer/Stakeholder. A specific example of a program metric might be turn-around time for consults processed via the telemedicine system.

6. Deploy an AFHCAN and COTS hybrid telemedicine system to the Family Medical Clinic. Consider a simultaneous deployment to Madigan Army Medical Center allowing MEDDAC-AK to send consults to its next higher medical element.

7. Formulate contingency plans for Fairbanks Memorial Hospital involvement, retrieval of some or all of telemedicine equipment from the Family Medical Clinic, and trigger point for disestablishing the program completely.

8. Monitor the program's progress using established measures. Gibson's (1996) research is a good starting point for analyzing cost savings during the program, effectiveness of referrals to other military services, and estimates of time saved. Also consider surveys for provider and patient satisfaction of the telemedicine program, then incorporate these suggestions into future program modifications.

Appendix A

Fort Greely Telemedicine Strengths, Weaknesses, Opportunities, Threats (SWOT)

Internal Strengths	Internal Weaknesses
-Dr Andreassen wants telemed -Equipment is already available & mostly deployed -Telemed champions at MEDDAC -Leadership experience with telemedicine -Leadership support of telemedicine -Informatics Advisory Council formation -Available AFHCAN budget -Development of measures of success (e.g., BSC) for project	-Lack of tech savvy at FMC -MEDDAC telemed implementation is non-existent -Connectivity at Fort Greely -Lack of extendibility to business apps at this point -No tracking of usage levels -Quasi proprietary nature of AFHCAN -Multiple IT initiatives (ICDB, TOL, telemed) vying for provider attention
External Opportunities	External Threats
-AFHCAN Project Office support -AFHCAN Integration Committee membership by MEDDAC Telemed Coordinator -COTS telemed technologies (e.g., Groove) -USARAK leadership support -Increased importance of Fort Greely in USARAK/U.S. plans -Establishment of Ft Greely clinic -Tie to Madigan/Tripler telemed efforts -New BACH building	-Lack of dedicated interest in MEDDAC telemed by AFHCAN -Continuance of AFHCAN funds uncertain -Acceptance by patients & providers -Continued deployments/war efforts

Appendix B

Situational Analysis: Fort Greely Telemedicine Feasibility

1. Environment

a. Size.

1) Approximately 8 Tricare Prime Remote beneficiaries in surrounding area of Fort Greely.

2) Telemedicine carts delivered to MEDDAC-AK= 6 total

3) "Hubs of Internal Network" = 5 (BACH, Kamish Clinic, Ft Richardson Clinic, Elemendorf Hospital, Eielson Clinic)

4) AFHCAN Sites = 256 total

5) Providers/Ancillary staff at BACH = ~150

6) Beneficiary population growth expected = 300 AGR soldiers, and estimated 50 more soldiers/beneficiaries

b. Nature of competition.

1) Virtually non-existent for entry to healthcare system due to geographic isolation.

2) When referring away (consult) choices are effectively limited

3) Near exclusivity of some referral types allows for steep pricing of services

c. Macroenvironmental factors.

1) Fairbanks Memorial Hospital and Interior Alaska Region is Diagnostic Related Group (DRG) exempt—providers can charge premium for services.

2) Geographic isolation often leads to long evacuation routes, even using air assets.

3) Medicaid reimbursement does not exist for telemedicine in Alaska (but is pending review by the legislature this year).

2. The Market

a. Customers

1) Department of Defense military, family members and retirees via Tricare Prime Remote.

2) Mixture of Air Force and Army beneficiaries.

3) Influx of contractors and other workers associated with beefing up of Fort Greely will increase patient load for Dr. Andreassen.

b. Services (B = BACH; FG = Fort Greely/Dr. Andreassen)

* Pathology (B)/Lab (B/~FG)	* Family Practice (B/FG)	* Audiology (B)
* OB/GYN (B/~FG)	* Internal Medicine (B)	* Physical Therapy (B)
* Ear, Nose, Throat (B)	* Orthopaedics (B)	* Radiology (B/~FG)
* General Surgery (B)	* Mental Health Services (B)	* Optometry (B)
* Preventive Medicine (B)	*Pharmacy (B/~FG)	* Urgent Care (B/FG)

Appendix B (Continued)

c. Geographic Service Area

1) MEDDAC: Three primary points of care: Kamish Clinic and Bassett Army Community Hospital (Fort Wainwright/Fairbanks), Fort Richardson Clinic (Anchorage).

2) Family Medical Clinic: Fort Greely likely added within 18 months due to influx of DoD beneficiaries.

3) Coverage of roughly a 350 mile radius from Fairbanks

d. Marketing

1) Patient-focused care

2) An involved member of the Delta Junction (Family Medical Clinic) and Fairbanks (MEDDAC) communities

3) “Take care of the patient first, worry about finances later”

e. Demographics

1) Relatively young population (Fairbanks), with few retirees

2) Only point of care for ~ 100 miles

3) “Bush Medicine”

4) Expected population arriving at Fort Greely are active National Guardsmen. These servicemembers tend to be older than active soldiers.

3. The Organization

a. Mission:

1) BACH serves as the primary military medical treatment facility (MTF) north of the Alaska Range providing primary and specialty care services

2) Family Medical Clinic (Fort Greely/Dr. Andreassen) provides urgent and family care to Delta Junction and surrounding areas.

b. Culture

1) Take care of the patient first

2) Try to handle care in house within limitations but not be afraid to send patient to another facility that is better suited for quality of care

3) “We can only do what we can do”

4) “Forward Operating Base Bassett”

c. Marketing Strategies

1) No marketing strategy for telemedicine exists. This include within the organization as well as to external agencies.

2) AFHCAN & MEDDAC-AK organizations have web sites, MEDDAC leadership attends town-hall style meetings, and maintains a visible presence in the community.

d. Finance

1) Current finance reimbursements for Tricare Prime Remote patients centrally managed by TMA.

Appendix B (Continued)

2) Family Medical Clinic at Delta Junction has a limited budget.

3) MEDDAC budgets from year to year are consistent. Roughly $23 million annually.

4) MEDDAC has greater than $400,000 in a separate budget for telemedicine (maintained by AFHCAN).

5) Pending finance initiative would favor MEDDAC recapturing lost referrals to Fairbanks providers by Delta Family Medical Clinic.

6) Family Medical Clinic at Delta Junction essentially refers all patients to other agents than MEDDAC.

e. Information Systems

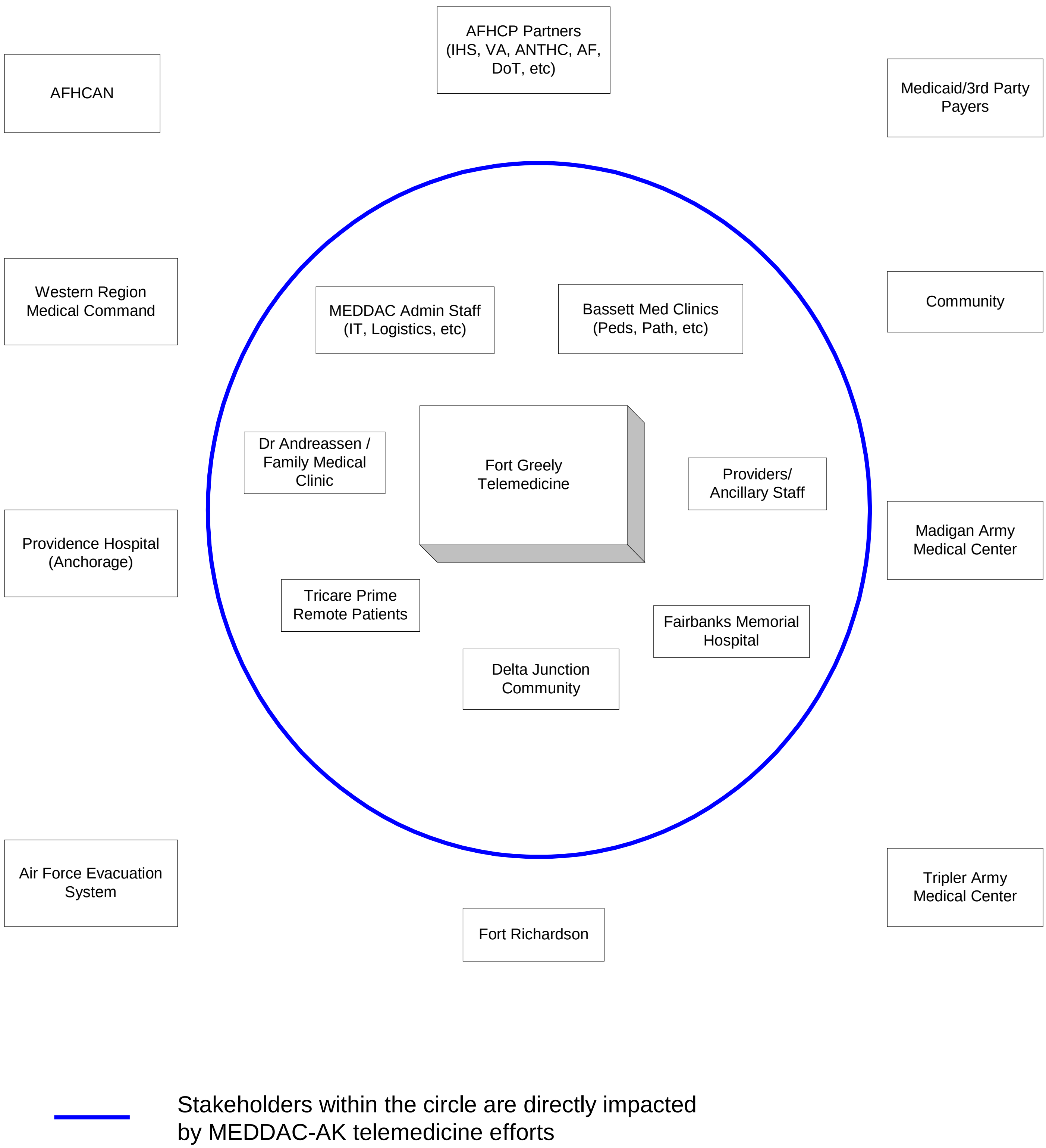
1) "100 Most Wired Hospitals" Award for BACH

2) IMD is mid-fielding for multiple systems. The shop works short-handed based on the TDA and organizational energy is spread thin.

3) Family Medical Clinic at Delta Junction apparently has dialup services only

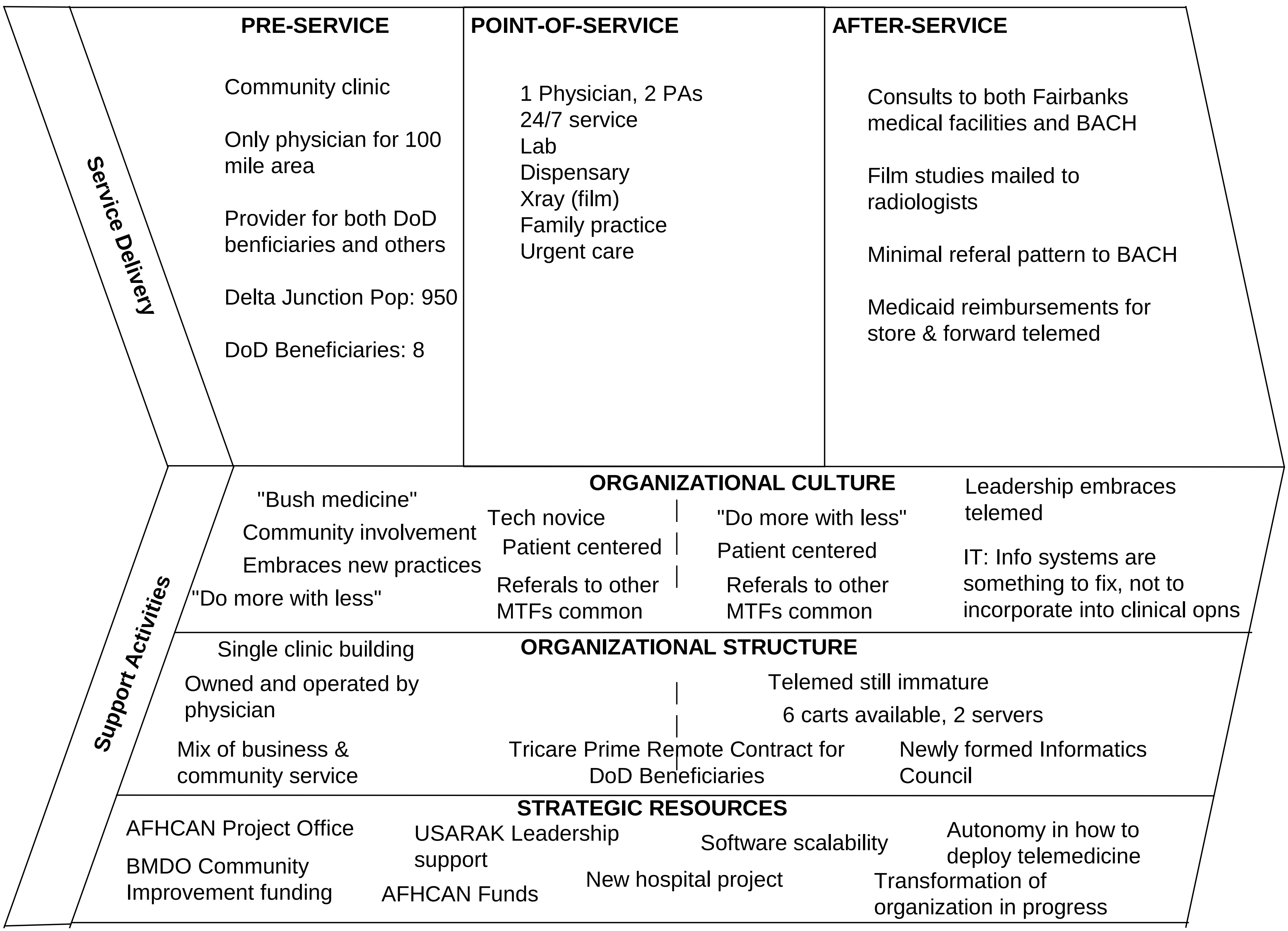
Appendix C

Fort Greely Stakeholder Analysis



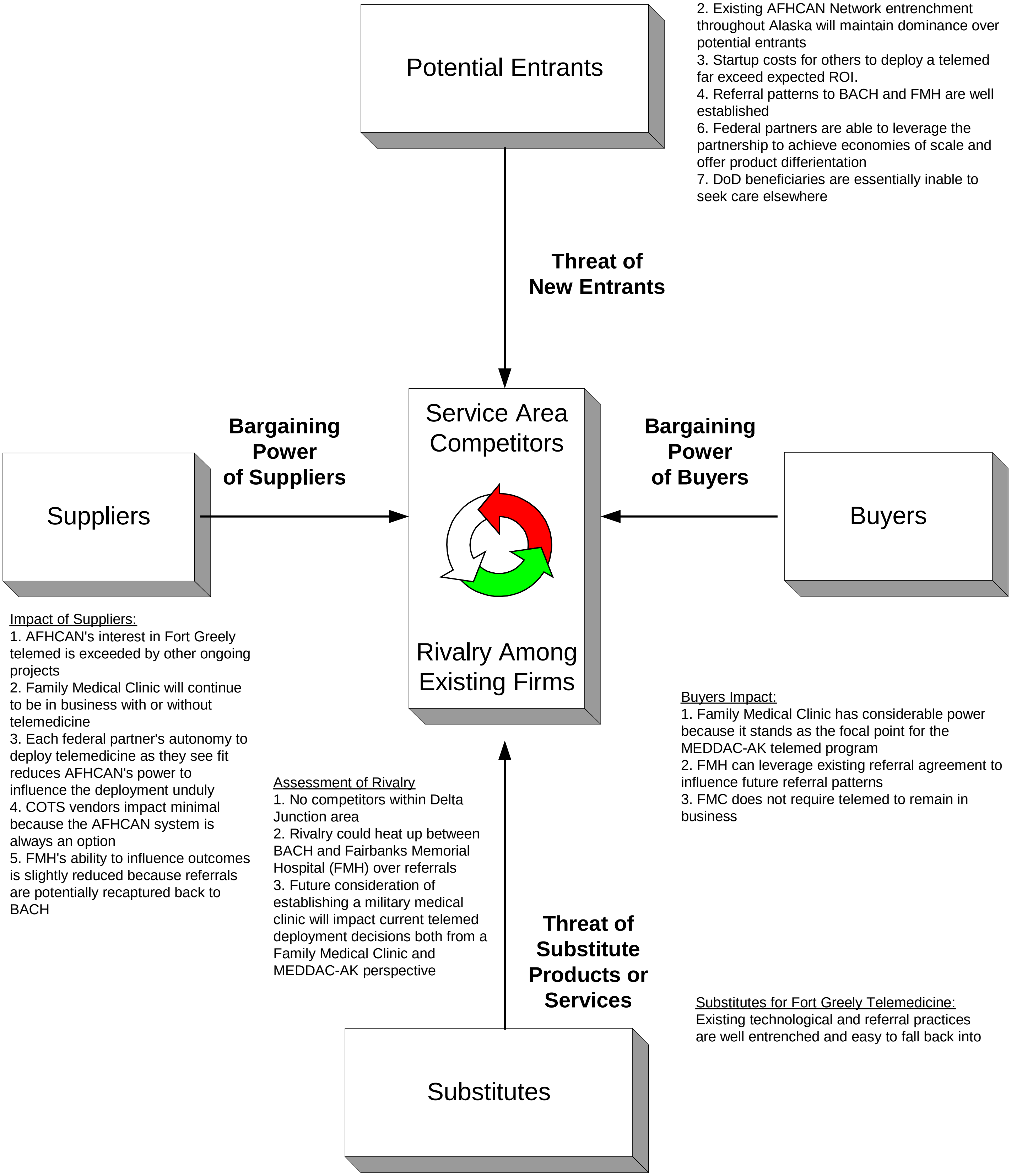
Appendix D

Fort Greely/Family Medical Clinic Telemedicine



Appendix E

Porter's Analysis



<u>Barriers to Entry:</u>
1. Cash flow for Family Medical Clinic would preclude a unilateral telemedicine initiative at this time
2. Existing AFHCAN Network entrenchment throughout Alaska will maintain dominance over potential entrants
3. Startup costs for others to deploy a telemed far exceed expected ROI.
4. Referral patterns to BACH and FMH are well established
6. Federal partners are able to leverage the partnership to achieve economies of scale and offer product differientation
7. DoD beneficiaries are essentially inable to seek care elsewhere

<u>Impact of Suppliers:</u>
1. AFHCAN's interest in Fort Greely telemed is exceeded by other ongoing projects
2. Family Medical Clinic will continue to be in business with or without telemedicine
3. Each federal partner's autonomy to deploy telemedicine as they see fit reduces AFHCAN's power to influence the deployment unduly
4. COTS vendors impact minimal because the AFHCAN system is always an option
5. FMH's ability to influence outcomes is slightly reduced because referrals are potentially recaptured back to BACH

<u>Buyers Impact:</u>
1. Family Medical Clinic has considerable power because it stands as the focal point for the MEDDAC-AK telemed program
2. FMH can leverage existing referral agreement to influence future referral patterns
3. FMC does not require telemed to remain in business

<u>Assessment of Rivalry</u>
1. No competitors within Delta Junction area
2. Rivalry could heat up between BACH and Fairbanks Memorial Hospital (FMH) over referrals
3. Future consideration of establishing a military medical clinic will impact current telemed deployment decisions both from a Family Medical Clinic and MEDDAC-AK perspective

<u>Substitutes for Fort Greely Telemedicine:</u>
Existing technological and referral practices are well entrenched and easy to fall back into

Appendix F

TOWS Analysis: Fort Greely Telemedicine

	Internal Strengths -Dr Andreassen wants telemed -Equipment is already available & mostly deployed -Telemed champions at MEDDAC -Leadership experience with telemed -Leadership support of telemed -Informatics Advisory Council formation -Development of measures of success (e.g., BSC) for project	**Internal Weaknesses** -Lack of tech savvy at FMC -MEDDAC telemed implementation is non -existent -Connectivity at Fort Greely -Lack of extendibility to business apps at this point -No tracking of usage levels -Quasi proprietary nature of AFHCAN -Multiple IT initiatives (ICDB, TOL, telemed) vying for provider attention
External Opportunities -AFHCAN Project Office support -AFHCAN Integration Committee membership by MEDDAC Telemed Coordinator -COTS telemed technologies (e.g., Groove) -USARAK leadership support -Increased importance of Fort Greely in USARAK/U.S. plans -Establishment of Ft Greely clinic -Tie to Madigan /Tripler telemed efforts -New BACH building	**4. Future Quadrant** -Related diversification -Vertical integration -Market development -Product development -Penetration	**2. Internal Fix-It** -Retrenchment -Enhancement -Market development -Product development -Vertical integration -Related diversification
External Threats -Lack of dedicated interest in MEDDAC telemed by AFHCAN -Continuance of funds (AFHCAN 's ability to tap into our piece of project funds) -Acceptance by patients -Continued deployments/war efforts	**3. External Fix-It** -Related diversification -Unrelated diversification -Market development -Product development -Enhancement -Status quo	**1. Survival Quadrant** -Unrelated diversification -Divestiture -Liquidation -Harvesting -Retrenchment

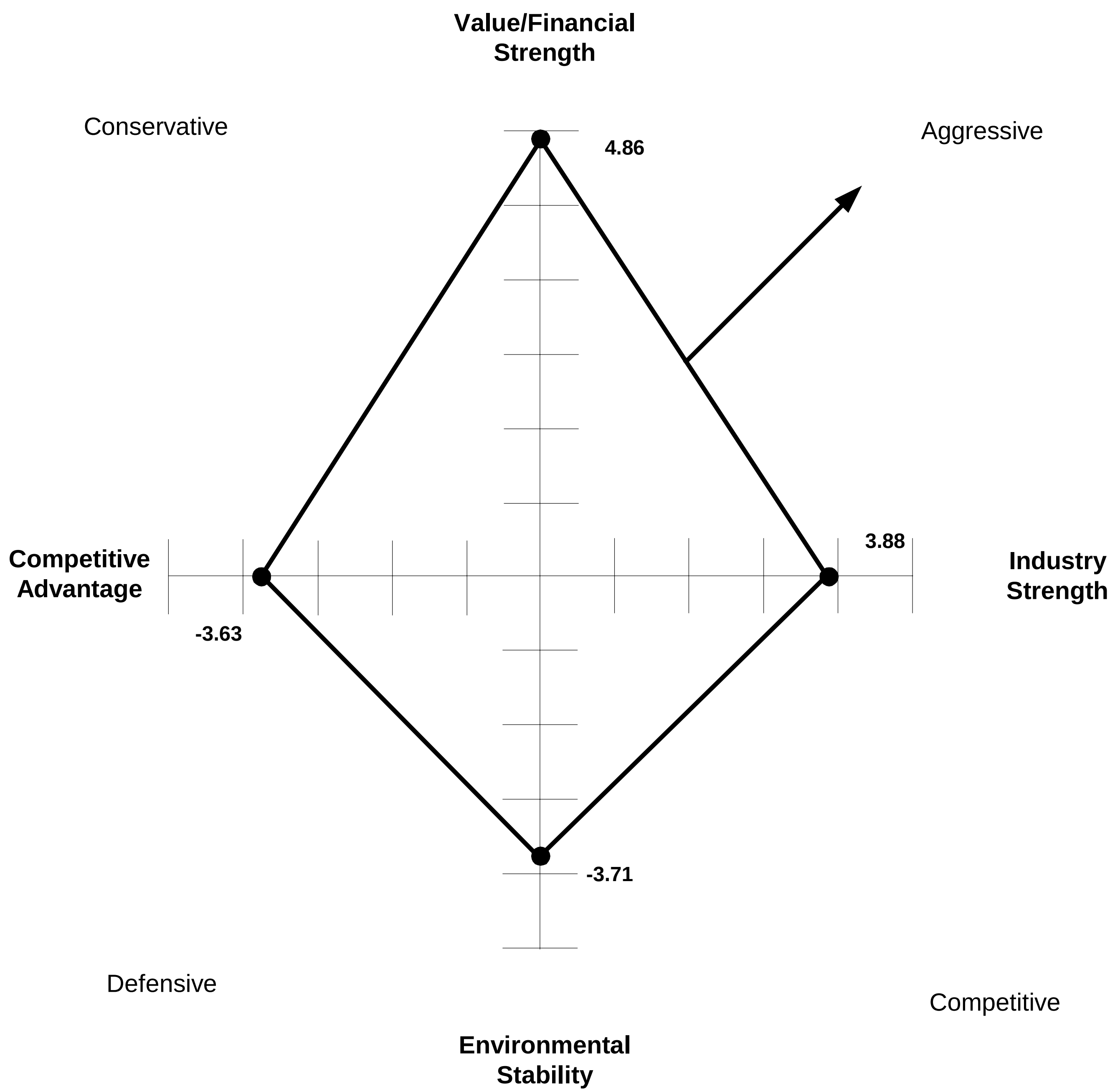
Appendix G Strategic Position and Action Evaluation (SPACE)

Factors Determining Environmental Stability										
Technological changes	Many	0	**1**	2	3	4	5	6	Few	
Rate of inflation	High	0	1	2	3	4	**5**	6	Low	
Demand variability	Large	0	**1**	2	3	4	5	6	Small	
Price range of competing products	Wide	0	1	2	3	4	**5**	6	Narrow	
Barriers to entry into the market	Few	0	1	2	3	4	**5**	6	Many	
Competitive pressure	High	0	1	2	3	4	5	**6**	Low	
Price elasticity of demand	Elastic	0	1	2	**3**	4	5	6	Inelastic	
							TOTAL:		-3.71	(Neg #)
Factors Determining Industry Strength										
Growth potential	Low	0	1	2	3	4	**5**	6	High	
Profit potential	Low	0	1	2	**3**	4	5	6	High	
Financial stability	Low	0	1	2	3	**4**	5	6	High	
Technological know-how	Simple	0	1	2	3	**4**	5	6	Complex	
Resource utilization	Poor	0	1	**2**	3	4	5	6	Good	
Captial intensity	High	0	1	2	3	4	5	**6**	Low	
Ease of entry into market	Easy	0	1	2	3	4	**5**	6	Difficult	
Productivity, capacity utilization	Low	0	1	**2**	3	4	5	6	High	
							TOTAL:		3.88	(Pos #)
Factors Determining Competitive Advantage										
Market share	Small	0	1	2	3	4	5	**6**	Large	
Product quality	High	0	1	**2**	3	4	5	6	Low	
Product life cycle	Late	0	1	2	3	4	5	**6**	Early	
Product replacement cycle	Vary	0	1	**2**	3	4	5	6	Fixed	
Customer/patient loyalty	Low	0	1	2	3	4	**5**	6	High	
Competition's capacity utilization	Low	0	1	**2**	3	4	5	6	High	
Technological know-how	Low	0	1	2	3	**4**	5	6	High	
Vertical integration	Low	0	1	**2**	3	4	5	6	High	
							TOTAL:		-3.63	(Neg #)
Factors Determining Financial Strength										
Return on investment	Low	0	1	**2**	3	4	5	6	High	
Leverage	No	0	1	2	3	4	**5**	6	Balanced	
Liquidity	No	0	1	2	3	4	**5**	6	Balanced	
Capital required/capital available	High	0	1	2	3	4	5	**6**	Low	
Cash flow	Low	0	1	2	3	4	**5**	6	High	
Ease of exit from market	Hard	0	1	2	3	4	**5**	6	Easy	
Risk involved in business	Much	0	1	2	3	4	5	**6**	Little	
							TOTAL:		4.86	(Pos #)
Quadrant Equations (Sum of Absolute #s):										
Aggressive= (Industry Strength+Financial Strength)									**8.73**	
Defensive= (Competitive Advantage+Environmental Stability)									7.34	
Competitive= (Environmental Stability+Industry Strength)									7.59	
Conservative= (Competitive Advantage+Financial Strength)									8.48	

Directional Strategy to Adopt:
Aggressive

Appendix G (Continued)

SPACE Quadrant Graph



Appendix G (Continued)

Directional and Adaptive Strategies for SPACE Analysis

Conservative Status Quo Unrelated Diversification Harvesting	**Aggressive** Related Diversification Market Development Product Devlopment Vertical Integration
Defensive Divestiture Liquidation Retrenchment	**Competitive** Penetration Enhancement Product Development Market Development Status Quo

Appendix H

Evaluation Criteria	Weight	AFHCAN Only Raw Score	Weighted Score	AFHCAN Hybrid Raw Score	Weighted Score	COTS Raw Score	Weighted Score
Supports Strat Analysis results	3	3	9	4	12	4	12
Political	3	5	15	5	15	3	9
Scalability/Flexibility	3	3	9	4	12	4	12
Smooth transition to Greely Clinic	3	1	3	3	9	4	12
Solution desired by customer	3	3	9	5	15	3	9
Solution desired by commander	3	4	12	3	9	3	9
Ease of use/Training required	2	3	6	2	4	3	6
Cost/Budget	2	5	10	3	6	3	6
Maintenance/Tech support	2	5	10	3	6	2	4
Customizable	2	2	4	2	4	4	8
Security	2	4	8	3	6	5	10
Connectivity/Bandwidth needed	2	2	4	2	4	3	6
Business Applicability	2	2	4	2	4	5	10
Leverage Emerging Technologies	1	3	3	3	3	5	5
Deployability	1	4	4	3	3	3	3
Telerad capable	1	2	2	3	3	4	4
Proven/tested in the field	1	4	4	3	3	2	2
Homehealth capable	1	1	1	3	3	4	4
Autonomy for use	1	1	1	1	1	4	4
Totals		57	118	57	122	68	135
(Higher is better)							

Criteria Definition

Supports Strat Analysis results: How well the alternative supports the recommended directions from of the TOWS Matrix and SPACE Analysis

Political: Improves MEDDAC-AK image with AFHCP, USARAK, and Fort Greely committee (indicates commitment)

Scalability/Flexibility: Allows for increase in volume; lacks problems associated with proprietary systems and software; can incorporate emerging technologies without major overhaul

Smooth transition to Ft Greely Clinic: If a clinic was built at Fort Greely, hardware can be uninstalled with a minimum amount of effort; mitigates disruption to Family Medical Clinic business practices

Solution desired by customer: The extent that Family Medical Clinic has expressed interest in that option

Solution desired by commander: The extent that the MEDDAC-AK commander has expressed interest in that option

Ease of use/Training required: The scope of additional training required; how well the system can be used without manuals

Cost/Budget: How much the alternative adds to expenses already disbursed for MEDDAC telemedicine; one-time and ongoing expense level included

Maintenance/Tech support: How much tech support is available locally; the cost of support; how much support may be required to maintain

Customizable: How well the system can be tailored to specific uses/situations encountered at Family Medical Clinic

Security: How well the system maintains data security/is HIPAA compliant; how well the system maintains this security over wireless modes

Connectivity/Bandwidth needed: How well the system works over dial-up connections

Business Applicability: How adaptable is the system to handle 'back office' automation requirments such as billing management; is the system medical only or can it be used for other functions

Leveraging Emerging Technologies: The extent the system incorporates currently the latest technological advances

Deployability: The ease of which the system can be deployed and put into use at Family Medical Clinic

Telerad capable: The extent that the system can handle teleradiology and DICOM image standards

Proven/tested in the field: The current phase in the product life cycle the system is; the extent that the system has been used in telemedicine

Homehealth capable: How adaptable is the system for homehealth application

Autonomy for use: The extent to which the system can also be used at home, TDY, or away from the clinic

Alternatives Definition

AFHCAN Only: System deployed is entirely comprised of standard AFHCAN equipment already issued to MEDDAC-AK

AFHCAN Hybrid: AFHCAN equipment, software and some COTS; AFHCAN is the core functionality

COTS+Groove: An aggregation of COTS systems and Groove software; no AFHCAN equipment/software involvement

Appendix I

Business Case Analysis

Net Present Value Analysis for Fort Greely Telemedicine Project

Net Present Value of Cash Flows over 5 Years							
	Discount Rate	3%	Year 1	Year 2	Year 3	Year 4	Year 5
Projected Expenses			$106,068.00	$106,068.00	$106,068.00	$106,068.00	$106,068.00
Projected Revenues (cost avoidance)			$67,308.87	$67,308.87	$67,308.87	$67,308.87	$67,308.87
Net Income (Revenues-Total Expenses)			($38,759.13)	($38,759.13)	($38,759.13)	($38,759.13)	($38,759.13)
Discounted cash flows			($37,630.23)	($36,534.20)	($35,470.10)	($34,436.99)	($33,433.97)
				($74,164.43)	($109,634.52)	($144,071.51)	
				Loss @ Yr2	Loss @ Yr3	Loss @ Yr 4	
Net Present Value	($177,505.48)	(sum of all discounted cash flows)					

Cost Avoidance				
	FY 02 Ave Pt Cost	FY 02 Ave Govt Cost	Totals (per visit)	Average LOS
Outpatient	$31.20	$118.15	$149.35	
Inpatient	$160.77	$903.66	$1,064.43	4.4
			$4,683.49	
Pt Travel	(meals, incidentals)		$76.50	
		Ave	$2,492.92	(per visit)

Annual Est Cost Avoidance $67,308.87

Expenses			
Connectivity	$8,839.00	(per month)	
Equipment	$0.00	(initial/startup)	(for future estimates including equipment purchases, COTS software, etc)

Referral Rate Conversion		
Telemed referrals: Tripler Method	0.36	36%
Family Medical Clinic referrals	2	Annualized
Current population	8	
Current annual referral rate	0.25	25%
Expected population	300	(or Popluation to break even using Goal Seek)
Expected referrals for new pop	75	
Expected referrals avoided	27	Annual Est Cost Avoidance $67,308.87

Notes

(yellow)	Denotes modifyable cells
(green)	Denotes target figure

NPV Formula

$$\sum_{t=1 \dots n} A/(1+r)^t$$

Goal Seek Steps (to estimate break even point of referrals)
Tools, Goal Seek, Set Cell C15 (NPV total), Set to 0 (zero), By Changing Cell C37 (Expected population)

Appendix J

INFORMATICS ADVISORY COUNCIL

1. PURPOSE: To establish and sustain the MEDDAC-Alaska Informatics Advisory Council.

2. REFERENCES:

a. AR 5-1, Army Management Philosophy, 12 June 1992

b. AR 25-1, Army Information Resources Management Program, 25 March 1997

c. AR 25-3, Army Life Cycle Management of Information Systems, 15 October, 1989

d. AR 40-3, Medical, Dental, and Veterinary Services, 12 December 2002

3. COMPOSITION: The Deputy Commander for Clinical Services chairs the USA MEDDAC-Alaska Informatics Advisory Council with membership as follows:

Deputy Commander, Clinical Services (Chairman)

a. Chief, Clinical Services Division (Vice Chairman)
b. Chief, Medical-Surgical Nursing
c. Chief, Information Management Division (as required)
d. Chief, Managed Care Division (as required)
e. Chief, Fort Richardson Clinic
f. Chief, Fort Greely Clinic
g. Chief, Kamish Family Practice Clinic
h. SysAdmin, Information Management Division (AFHCAN)
i. Chief, Ear, Nose, and Throat
j. Chief, Internal Medicine
k. Occupational Health Nurse, Preventive Medicine
l. SysAdmin, Information Management Division (ICDB)
m. Chief, Medical Maintenance
n. Senior PA, Kamish Family Practice Clinic
o. Nurse Case Manager, Managed Care Division
p. Senior Nurse Practitioner, Urgent Care Center
q. Statistical Analyst, Managed Care Division – Recorder
r. Nurse Methods Analyst, Health Facilities Planning Office (as required)
s. IT Systems Coordinator, Health Facilities Planning Office

4. FUNCTIONS:

a. Serve as the primary working group for clinical integration of all information systems including the Composite Health Care System (CHCS), Integrated Clinical Database (ICDB), Tricare Online (TOL), and the MEDDAC-Alaska Telemedicine program.

b. Advise the Executive Committee on major policy matters concerning implementing information systems into organizational business practices.

c. Devise implementation plans for all clinically oriented information systems.

d. Develop and monitor benchmarks for success for clinical information systems.

e. The Informatics Advisory Council will establish task groups as required to accomplish committee responsibilities.

Appendix J (Continued)

f. Integrate clinical information systems programs into the MEDDAC-Alaska Strategic Plan.

5. MINUTES: The Recorder is responsible for preparing minutes of the Informatics Advisory Council proceedings. Minutes will be forwarded to the Executive Committee for approval/disapproval of recommendations within five working days of each meeting. Approved record copies will be filed with the C, Clinical Services Division and the Information Management Officer.

6. FREQUENCY OF MEETINGS:

a. The council will meet on the 1st Thursday of the month at 1200 hours, or as directed by the Chairman to consider matters of a timely fashion.

b. The agenda will be formulated by the Recorder in concert with the Chairman and will be provided to members in advance for their consideration.

c. Requests to include items on the agenda will be forwarded to the Chairman, ATTN: MCUC-DCCS. Matters within the scope of normal Information Management Division staff activities will not normally be presented to the committee but will be forwarded for IMD consideration.

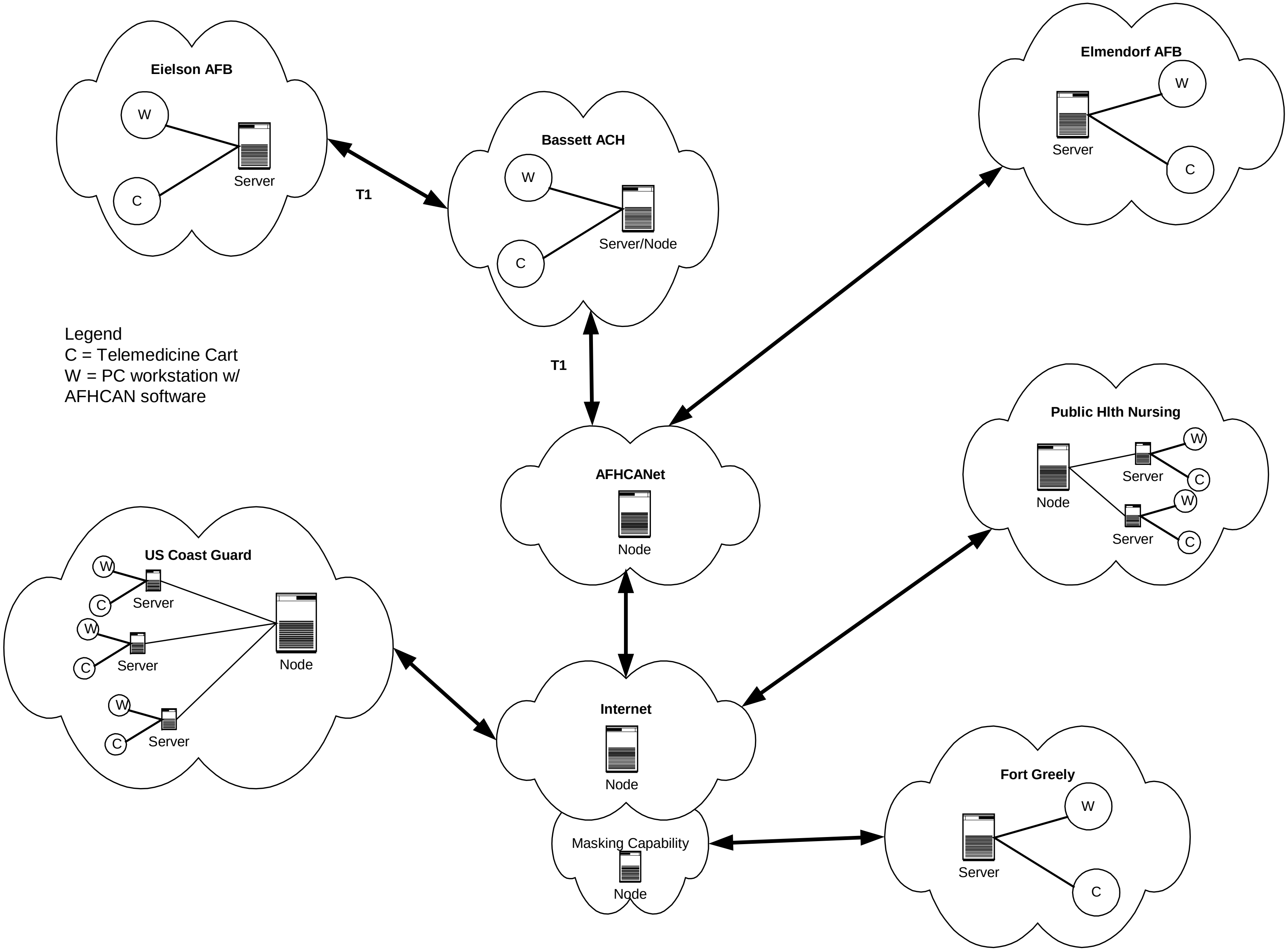
Appendix K

Definitions

Alternative	See Course of Action
COTS	Commercial Off The Shelf equipment, software, support or technologies
Course of Action	An option to consider for the telemedicine system to deploy
Family Medical Clinic	Used interchangeably with Fort Greely, Delta Junction, and Dr. Andreassen. Addresses the current array of medical services or geographic service area of Fort Greely/Delta Junction
Market Development	The adaptive strategy that suggests expansion of present products or services into new geographic markets or to new segments within a present geographic market
Penetration	The adaptive strategy that looks to increase market share for present products or services in present markets through marketing efforts
POP	Point of Presence
Product Development	The adaptive strategy that seeks to extend the existing life of a present product line, or improve on present services
Related Diversification	The an adaptive strategy where the organization adds a new related product or service category
T1 Line	An always-on telephone line connection that transfers data at a speed of 1.544 million bits per second
Vertical Integration	The adaptive strategy that looks to add new members along the distribution channel, either towards a later planned stage of implementation, or an earlier stage overlooked

Appendix L

AFHCAN Network (Fort Greely Proposed Connection Included)



Appendix M

Overview of Groove Software (http://www.groove.net)	
Features/Topic	**Discussion**
Overview of Groove	-Groove is a collaboration/groupware program developed by the creator of Lotus Notes. It is both a program and a platform where other tools (functions) can be developed by organizations to run within the Groove workspace -Groove allows for joint computing tasks using an Internet or LAN connection to keep all members of a combined desktop space (aka 'shared space') synchronized. It works in both synchronous and asynchronous mode, where changes to a shared space done offline are automatically updated to all space members the next time a connection to the Internet is made -A single Groove license can be used on up to 5 machines
Tools available within Groove	Calendar, Discussion, File sharing, PowerPoint co-viewing, Voice over Internet Protocol (VoIP), text Instant Message chat, Co-edit of MS Word documents, Picture viewing, Whiteboard, Joint web browsing, meetings management, project management, teleradiology tool, and others
Security	Groove uses a 192 bit security structure that encrypts data on each users computer, and while transmitted. Only members of a shared space have the cryptovariables to decode data sent
Certifications	FIPS 140-2; DoD Joint Interoperability Collaboration Tool Standards compliant
Selected Customers	CENTCOM Staff; DARPA; Hewlett-Packard; Pfizer; Dell; Cal State University; GlaxoSmithKline; Harvard Medical School; Yale
Future Potential & Uses	Microsoft has invested $88 million in Groove Networks; Pocket PC compatibility using SOAP and XML; Version 2.5c is available

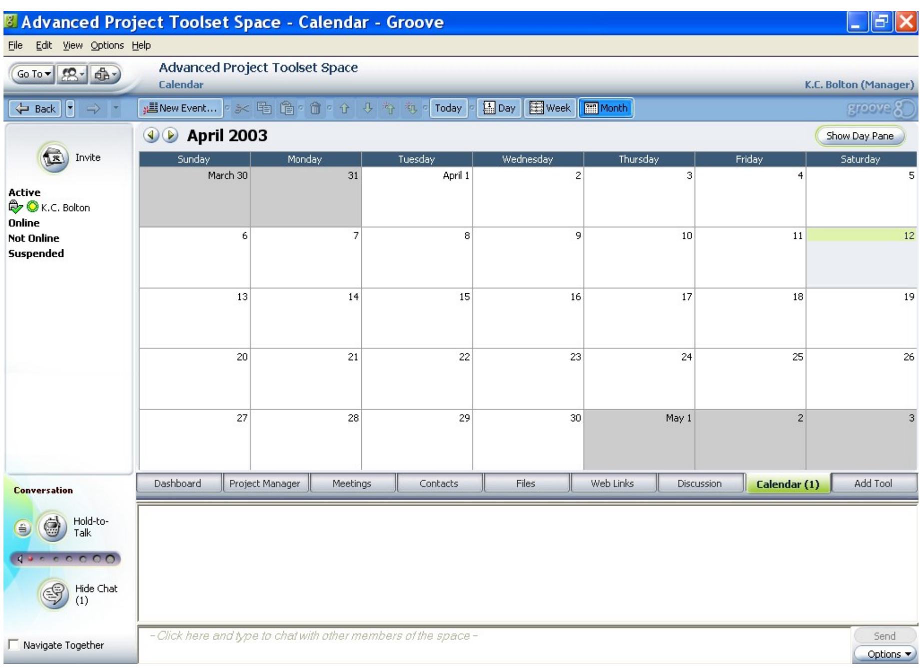


Figure 3. Screenshot of a Groove workspace

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